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VOLUME XXIII. OCTOBER, NINETEEN HUNDRED TWO. NUMBER 3.

THE PRESENT STATUS OF THE SEWAGE PURIFICATION PROBLEM.

FILTRATION.

The subject of filtration of sewage occupied a large part of Professor Kinnicutt's paper before the Boston Society of Civil Engineers on "The Present Status of the Sewage Problem in England," a portion of which was considered in the September number of MUNICIPAL ENGINEERING under the same general heading as this article. He states that it is generally conceded in England that the effluent from the septic tank can be purified by contact beds, so as not to undergo secondary putrefaction, at the rate of about 350,000 gallons per acre per day, in some cases running as high as 500,000 gallons. There is considerable diversity of opinion as to how long contact beds will retain their efficiency if these rates are continued, and there are numerous methods of applying and operating the beds to extend their life.

"The permanent efficiency of a contact bed depends upon the non-filling up of the void spaces between the surfaces of the filling material, and as the liquid capacity depends on the cubic area of these void spaces, the efficiency of a bed will remain practically constant if the liquid capacity can be maintained. The chief causes of loss in capacity of contact beds are settling down of material, breaking down of material, insoluble matter entering the bed and growth of organisms.

"Every one agrees that there is a loss of capacity in contact beds by the settling down of the filling material; this, however, takes place in the first few months of use; it amounts to about one-third of the initial liquid capacity and can be taken into account when making the beds. Breaking down of the filling material undoubtedly causes a loss, but if a sufficiently hard filling material is used this loss is comparatively small.

"The loss of liquid capacity from these two causes is, therefore, not of a serious character, being of a known amount or not increasing after the first few months. The loss that takes place during the working of the bed is caused by insoluble matter entering the bed and by the growth of organisms. If this loss can not be prevented or controlled, it is a most serious matter, for upon the prevention or control depends the economical working of the contact process. The solid matter that is carried on to a bed depends upon the character of the sewage and the effectiveness of previous treatment. Without question, the greater part of the suspended matter must be removed, as can be done by chemical precipitation or the septic tank, before the sewage is run upon the beds. If this is done the remaining suspended matter will consist chiefly of sand and clay in a fine state of subdivision, and with acid iron sewage a part of the suspended matter will be iron sulphide. It appears, from experiments made in England, as though these substances could be retained in the top three inches of the bed if the upper three inches of the filling material are of much finer character than the rest of the bed. These upper three inches, when it becomes necessary, can be removed and replaced without any very great expense.

"The chief and serious question, and the one about which opinions most differ, is the loss of capacity of a bed by the growth of organisms through the whole bed and the deposition in the bed of the ash or non-putrescible part of organic substances. As to the growth of organisms, it has been shown that if the material of a contact bed in active condition be examined every piece is seen to be coated over with a slimy growth, which, if removed and dried, cuts like a jelly. Under the microscope the

slime is found to be chiefly composed of bacteria and zooloca. It is on the presence of this slimy material that the action of the bed depends; the greater the amount, up to a certain limit, the greater the efficiency: if, however, this limit is overreached, the liquid capacity is greatly diminished, the bed becomes spongy and the water will not drain away."

Mr. Fowler, from the results of the Manchester experiments, believes the growth of organisms can be regulated so that the liquid capacity of the bed will not be reduced more than a limited amount.

Professor Sedgwick, in the discussion of Professor Kinnicutt's paper, seems to state the same belief when he says that rich sewage will attract the micro-organisms, leaving the poorer parts to go by unchanged, and the passage of the bacteria to the jelly stage causes the filling of the bed with non-active material. He suggests, therefore, that filters which have clogged may have been fed with stronger sewage than those remaining comparatively open.

This would again suggest that the contact beds would be more successful in this country with dilute sewage than in England, for the same purity of effluent. The English sanitarian is usually, however, satisfied with a much less degree of purification, provided the effluent is not liable to secondary putrefaction, than is expected in this country.

Professor Kinnicutt showed a number of pictures of English plants, some of which are here reproduced by courtesy of the Journal of the Association of Engineering Societies. The first plate shows a small

I. DOUBLE CONTACT BEDS FOR SEWAGE FILTRATION. ENGLAND.

Dibdin double contact bed on a private estate in England. The second and third plates show the method of construction of the contact beds at Manchester, England, which are under construction as a result of the experiments described in MUNICIPAL ENGINEERING, volume XX, page 257. Plate II shows the bottom of a bed and the channels for the effluent from the bed, and Plate III the method of filling the tanks with the filtering material. The large pieces seen on the bottom of the tank are placed over the drain channels. Four half-acre beds have been finished, eight more are nearly completed, and the plans call for forty-eight

II. FLOOR OF CONTACT BED. MANCHESTER, ENGLAND.
SEWAGE PURIFICATION.

III. FILLING CONTACT BED. MANCHESTER,
ENGLAND. SEWAGE PURIFICATION.

more, and in addition an area for treating storm water at a greater rate of filtration. Plates IV and V give two new views of the filter beds at Accrington, England, Plate IV showing the filter under construction and Plate V in operation. This plant is described in the same article in volume XX, page 260, with additional views. The extensions of the beds and the automatic arrangements for sprinkling sewage on the beds through revolving perforated pipes are clearly shown in Plate V. The open walls of the filters and the coarse filling next to them allow free access of air to the beds at all times. This filter is said to operate successfully at a rate of 2,000,000 gallons per acre per day. A steam pipe is placed in the delivery pipe of the automatic sprinkler so that a small jet of steam can be blown into the sewage before distribution over the filter, thus raising the sewage temperature, and thence that of the bed to about 70 degrees, giving the bacteria a most favorable temperature condition and aiding the ventilation of the bed. Even with this heating, the opinions expressed were that under winter conditions in America the beds would soon be covered with ice and their action stopped.

Another continuous filter is the Stoddard, shown in Plate VI. Coke slag or cinder of 2 to 3-inch size, without fine material, is the filler, and the outer walls can be built up of the same materials in larger sizes as the water is drained off as rapidly as it passes down to the concrete base. The distribution of sewage over the bed is by metal gutters 2 inches wide and 1½ inches deep laid at right angles to the supply channel. Diamond-shaped perforations are cut along the upper edges and points are set on the under side so that as the sewage overflows the gutters it drops off the points. A capacity of 500 gallons per cubic yard is claimed, giving for a 6-foot depth of filter 4,840,000 gallons per acre per day. With storm water the filter has frequently run at 30 to 40 million gallons per acre per day. The cost is 35 to 40 shillings per square yard, 6 feet deep. The difficulty with freezing, and the constant attention necessary to keep the gutter system exactly horizontal and clean and clear are the objections brought out in the discussion.

Another view of the Corbett filter at Salford, before the filtering material is put in, is shown in Plate VII. The cinders used are those passed by a ½-inch mesh and rejected by ⅛-inch. The two delivery mains are 30 inches in diameter; they are connected to horizontal distribution pipes, on each of which are vertical pipes 10 feet apart and 10 feet high. Each of these vertical pipes is connected with a horizontal 4-inch pipe fitted with vertical spray jets every 5 feet, each having two ¼-inch holes set at an angle with each other. These jets spout the liquid up 5 to 8 feet to fall like rain on the surface. Dry weather flow is about the same as for the Stoddart or double this rate for storm water. The plant is expensive, but Professor Kinnicutt considers its chances of success better than those of any other of the so-called "intermittent continuous filters."

The conclusion regarding all the filters is that while believing in the principle involved in the continuous filtration of sewage which has been acted upon by anaerobic bacteria, he does not think any method yet devised can be considered as practical on a large scale in New England climate.

One point emphasized in the discussion was that the annual rainfall in England is scarcely more than half that in the eastern United States, being about 25 inches in the vicinity of Oxford and London, and that there are no such heavy rain storms as are frequent in American cities.

THE BROOKLINE BATHS.

By Waldon Fawcett, Washington, D. C.

The rapid extension of late years of municipal public baths of various kinds naturally serves to direct attention to and arouse interest in the Brookline public baths at Brookline, Mass., the first municipal bath of its kind in this country—that is, the pioneer municipal all-the-year-round bathing establishment with swimming facilities as well as cleanliness baths. In 1885 the town of Brookline built a small public swimming bath on the village brook at a cost of about $3,000, and this continued in use until 1895, when the initial steps were taken toward securing the present public baths.

Certain sections of the public statutes which have been accepted by the town of

IV. SEWAGE FILTER UNDER CONSTRUCTION NEAR ACCRINGTON, ENGLAND.

V. SEWAGE FILTERS NEAR ACCRINGTON, ENGLAND.

Brookline authorize towns to purchase or lease lands and to erect suitable buildings for public baths, also to fit up and furnish the same with the requisite furniture and conveniences and to raise and appropriate money for this purpose. The towns are also authorized to establish rates for the use of such baths, and may, if it be deemed best, make them wholly or partly self-supporting. The committee which was appointed to investigate the advisability of establishing municipal baths at Brookline consisted of two representatives of the board of health and a lady member of the board of overseers of the poor. The recommendation of this committee was for the construction of a bath-house which it was estimated would cost $25,000, and this sum was appropriated for the purpose. Subsequently an additional $15,000 was voted and a final appropriation of $3,000 was made for fitting up and furnishing the bath-house. In the preparation of the plans for the Brookline baths every effort was made to get the benefit of all previous experience in the field. The committee visited personally the best public and private swimming establishments in Boston, New York, Philadelphia, West Point and Annapolis, and plans and descriptions were secured from the most famous bathing establishments abroad, notably those in London and Birmingham, England, Stuttgart and Hamburg, Germany. Features from all these various institutions were embodied in the plans for the Brookline structure.

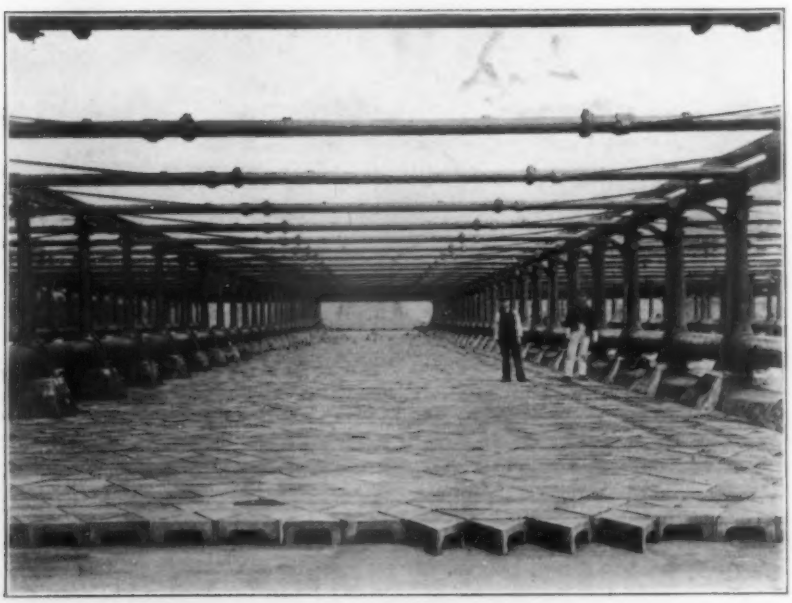
The location of the Brookline baths is admirable, the handsome T-shaped brick building being situated very near to the center of population of the community, adjacent to the high school, and facing the public playground. The head-house contains a vestibule, hall and waiting-room and access is gained through a handsome entrance in the center.

In the main portion of the building are the natatorium, spectator's gallery, running track and dressing-rooms. The main tank is eighty feet in length, twenty-six feet wide and has an average depth of four and one-half feet of water. The bottom of the tank slopes gradually and is four feet deep at one end and seven feet deep at the other. Forty-two dressing-rooms surround the swimming hall with a passageway on either side. The entire building is commodious and well-lighted. The stone floors of the passageway around the swimming-hall and the dressing-rooms are kept warm by special steam pipes underneath and the ventilating system is well-nigh perfect. All persons are required to take a preliminary cleansing bath before entering the swimming tank, and for this purpose five rain-baths are provided at the ends of the swimming-hall. A smaller tank is provided in what is known as the "instruction room." This tank which, like the other, is lined with white glazed brick and has a floor covering of adamantine mosaic of light tint, is twenty-two feet in length by ten feet in width and has an average depth of water of three and a half feet. Six large double dressing-rooms are provided in this room. There is, of course, a complete equipment of individual baths. In addition to those connected, as already mentioned, with the main swimming-tank and a rain-bath situated at the small tank in the instruction room, there is on the left of the entrance to the building a room containing six rain and foot-baths, three bath-tubs with an overhead rain-bath attachment and nine dressing-rooms. All told, there are fifteen of these rain-baths in various parts of the building and space is provided for three more when their installation is desired.

The rain-baths are of the "Gegenstrom" pattern and all fittings are in accordance with the most approved modern practice. The development of the slanting or rain-bath system, which is seen to such perfection at the Brookline institution, originated in the barracks of the German army. It combines speed, comfort and efficiency in bath-giving and it is claimed that it will ultimately displace to a great extent the ordinary bath-tub. A feature of the Brookline baths, unique among such institutions on this side of the Atlantic, is found in the plan which provides a passageway in the rear as well as in front of the dressing-rooms, thereby facilitating the ventilation and aiding the sanitary conditions generally.

Artificial stone forms the entire first floor, and imbedded in this are the supports of a heavy brass guard rail which extends around the swimming tank just above the surface of the water. Entrance to the water is gained by means of steps of Tennessee marble at the four corners. Overhead are large skylights supplemented by windows in the end gable, and both gas and electric light are provided for illumination at night. The water in the tanks, taken from the public supply, is constantly changing, and the

VI. STODDART FILTER, HORFIELD, ENGLAND.



VII. CORBETT FILTER, SALFORD, ENGLAND, BEFORE FILLING.

standard temperature, from 75 to 80 degrees, is easily maintained. Two horizontal tubular boilers in the front basement furnish the steam to heat the entire building and the water. A room, thirty by ninety feet in size, on the second floor of the head-house, is devoted to a gymnasium and lockers, and the building also contains toilet-rooms, a steam laundry for suits and towels and other conveniences.

The cost for the maintenance of the Brookline baths during the last calendar year was slightly less than $8,000, but the receipts for the period aggregated $6,151, so that the actual expense to the town for maintenance during the twelve-month was $1,842. One of the two boilers has always been found amply sufficient to do all the required work, and accordingly they have been used in alternation, about four hundred tons of coal having been used during the year. The expense for gas for lighting was $449 and for electricity for the same use, $28. The large tank in the natatorium holds 70,000 gallons of water and during the year the consumption of water aggregated 17,000,000 gallons, for which no charge was made. The heating plant is necessarily expensive in proportion to the size of the building, but it should be remembered that bathers must be taken care of in varying numbers which can not be definitely gauged in advance. The executive staff consists of a superintendent, an assistant, a matron, two laundresses and two engineers and this force is occasionally increased.

The schedule of hours for the use of the natatorium has been most carefully arranged. Men and boys are admitted during one or two four-hour periods every day in the week except Sunday. On certain days no restriction is made as to the male bathers while on other days separate intervals are assigned to men and boys over 16 and to school boys. Fees are 5, 10, 15 or 25 cents, according to the day of the week and the period. For women and girls the natatorium is open every week-day save Friday, the intervals being distributed on the same plan as in the case of the men and fees ranging from 5 to 15 cents. A schedule for men and women is also in force with reference to the private baths. These baths are free two days a week, whereas on other days a charge of 10 cents is made for a tub-bath and 5 cents for a shower-bath. The bathing fee includes the charge for suits, soap and towels. The maximum time allowed for a bath in the natatorium is thirty minutes and thirty minutes more for undressing and dressing. Patrons are permitted either to use the bathing suits provided by the establishment or may utilize their own costumes if the latter be approved by the superintendent. The use of the preliminary shower bath is limited to three minutes for men and boys, and five minutes for girls and women. Individual instruction in swimming is given for a fee of $1 a lesson or twelve lessons for $10. A matron is in attendance during the hours assigned for feminine bathers.

During 1900 more than 51,000 persons availed themselves of the privileges of the Brookline baths. Of the 45,000 persons who took baths in the natatorium upward of 42,000 paid, and the remainder were public school pupils who received free instruction. Of the 6,307 persons who indulged in rain or tub baths, only 437 paid. On an average 164 persons took baths each day that the bath-house was open. Upward of 6,000 persons took swimming lessons during the year, paying for the instruction more than $4,800, and of this sum the town of Brookline received 40 per cent. or nearly $2,000. A few years ago legislative action was secured defining the town's right to allow non-residents to use the public baths, and during the year over 6,000 non-residents availed themselves of that privilege. It was found that they did not in any way interfere with resident bathers and the fees which they contributed added materially to the income of the institution. A considerable number of students from Wellesley College and from the Boston Normal School of Gymnastics also receive swimming instruction in small classes.

The experience of the officials in charge of the Brookline baths has been such as to incline them against the free system. In Brookline swimming lessons are given as part of the regular school instruction, and the police are also entitled to the free use of the baths, so that all told nearly one-fifth of the whole number of baths taken during the past year were free. The committee in charge contend that many persons who have availed themselves of the free days have been able to pay, they basing this opinion on the fact that although the rain and tub baths are free only two days each week, scarcely one-fifteenth of the total number of persons who took these baths during the year paid fees. In short, the committee in

THE OBSERVATORY, ROCKFORD PARK, WILMINGTON, DEL.

charge feel that each succeeding year has justified their original opinion that the fee system is best not only because it has made the bath-house far less a burden to the taxpayers of the town, but also because it has enabled the exercise of a proper control over those who have taken baths.

HOW TO LAY PORTLAND CEMENT FLAGSTONE WALKS.

By F. H. Crafts, Assistant Engineer, State Engineer Corps, Rochester, N. Y.

The writer having had considerable experience with cement walks, both as engineer and contractor, has written this article to cover the answers to many inquiries concerning the details of their construction.

The materials required for a small job are six or eight scantlings of the best white pine, 2 x 4 inches x 16 feet, dressed on all sides; half a dozen cross-heads, 2 x 4 inches and as long as the walk is wide; some ash or oak ribbons, $3\frac{1}{2}$ inches wide and 10 or 12 feet long, $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$ inch thick, to be used in place of scantlings on curved walks. A small, round screen, having 64 meshes to the square inch; a large screen, 22 inches wide by 6 feet long, having 16 meshes to the square inch; an iron shod straight edge, $1\frac{1}{2}$ feet longer than width of walk; many iron pins and wooden stakes; also shovels, hoes, axes, picks, steel squares, iron wheelbarrows, rakes, hammers, pounders, carpenter's level, finishing tools and a tool-box.

A careful and experienced man should have charge of the work, as errors and mistakes in this business are very costly, and there are many ways of ruining a walk. The lines and grades should be given by a surveyor, the stakes being set with the help of instruments. The foreman should make sure that all of the stakes are right. It is possible that a wrong grade has been used. It makes a very great difference about the cost of a walk whether there is good or bad management. It is of great advantage to have skilled help, especially a skillful finisher, in putting down cement walks.

Street walks should be made four inches thick. Inside walks are narrower and may be thinner.

One barrel of cement is sufficient for forty-five square feet of walk. Only very high grade, slow-setting Portland cement is suitable for cement walks. One cubic yard of gravel is necessary for seventy-five square feet of walk, and must be clean and sharp. Sand is screened from the gravel with the large screen, and should be coarse.

On wet and heavy ground, or where the winters are very severe, a foundation five or six inches thick, made of gravel or of soft coal cinders, sprinkled and well tamped, is necessary. Cinders make the best foundation.

A stout chalk line of seine twine is used in checking grades and lines when setting scantlings for a walk. Street walks have a slope of a quarter of an inch to the foot toward the curb, sometimes more. In parks and some other places, instead of a side slope, the walk is made crowning in the center. If there is a lawn between the curb and walk, the drainage and appearance will be greatly improved by setting the walk one inch higher than the curb for each foot of width of lawn.

Concrete is mixed one part of cement by volume to six of gravel; top mortar is mixed one part of cement by volume to two of sand; separator is mixed one part of cement by volume to four of sand; dryer is mixed one part of cement by volume to one of sand.

For the concrete, a good-sized box is used, the gravel and cement placed in it, and this is all mixed up dry, turned over four or five times, but not wet until ready for use, then sprinkled, and turned over until all is damp; then immediately put in place with wheelbarrows. The top mortar is prepared at the same time, in another box, and in same manner. The separator is mixed in a wheelbarrow dry. The dryer is obtained by screening equal quantities of cement and sand through the small screen, and mixing it dry and using it dry at the proper time.

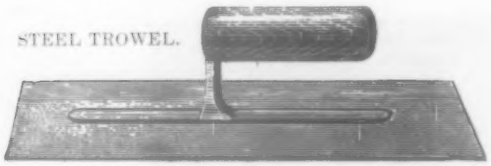
In steps, driveways or crossings, where walks will have very hard usage, concrete should be mixed one to five.

The scantlings are placed in position with cross-heads between and plenty of stakes outside to hold them securely. Surveyors' stakes are good. Spaces are marked off on the scantlings, indicating the joints of the blocks, which should form rectangles (not squares) for good looks. Wire nails are driven in part way, on outside, opposite the joints, to refer to later. The cross-heads are then placed at the joints, and secured with iron pins driven into the ground.

The concrete is packed in and well rammed until three and one-quarter inches thick, as shown by passing the straight-

VIEW THROUGH OBSERVATORY ARCH, ROCKFORD PARK,
WILMINGTON, DEL.

edge over the frame, which is outside of the walk, and enough concrete is usually laid to make five or six blocks at once, if one has a large contract. This leaves three-quarters of an inch for the thickness of the top mortar. The iron pins holding the cross-heads are all taken out long before the



STEEL TROWEL.

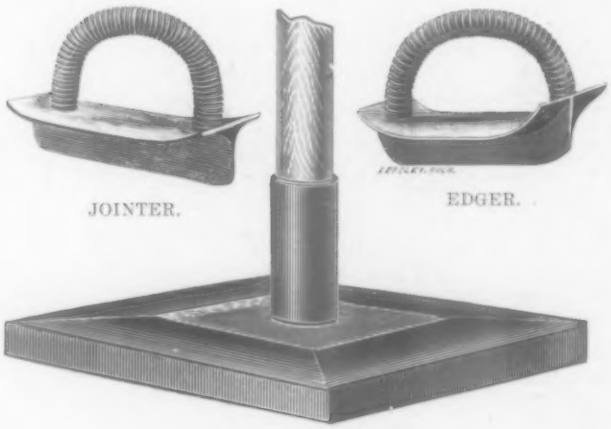
concrete is all in, and the cross-heads are held by concrete packed around them. After enough concrete is in place, the cross-heads are gently rapped with a small hammer, taken out carefully and the moist separator brought in with a shovel and well packed into the spaces left by the cross-heads, then rammed a little with a pounder. "Moist" means just wet enough to pack well.

Some people do not use cross-heads, but prefer pieces of clap-board, cut down to three inches wide, and set on edge at each joint, narrow side up; these are left in the walk, and finally rot out.

Top mortar is next wheeled in and spread over the concrete quite soft and wet as compared with the concrete, which just shows moisture when pounded; but the top mortar should not be pounded and must be wet enough to be worked easily under the trowel and straight-edge. The latter, moved by a man on each side of the walk, pushing it back and forth, up and down the length of each block, renders it smooth and true; trowels are used all the while to prevent the waste, or loss, of good mortar over the sides of the scantlings.

A steel trowel rubbed over the walk soon brings water to the surface, or at least moisture, which is taken up by a liberal sprinkling of the dryer. The dryer is carried in a pail and scattered by hand, then rubbed in with a float, or wooden trowel.

The straight-edge (one and one-half inches thick) is laid flat across the walk with the iron in line with the wire nails, in order to be exactly in line with the joints; a man, standing on this, and using a stout-pointed trowel, keeping the trowel always against the straight-edge, cuts down through the walk, working all the way across, and finally passes his trowel back and forth from one side to the other, making a clean-cut joint, and does the same with the other joints. When clap-boards or tar paper are in the joints they are cut only one inch deep. Some one follows after, with the finishing tools, jointer and edger, and polishes up the edges. A plasterer's trowel is now used to give each block a fine finish. If the blocks happen to be wet, one must wait awhile, for a walk must not be finished wet. The atmosphere will quickly dry up some of the moisture.



JOINTER. EDGER.

IRON POUNDER.

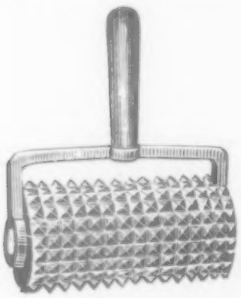
When the dot roller is to be used on a walk, it looks better to have a border all around each block, four inches wide. A chalk line held taut on the walk at points already marked with a pair of steel compasses and pressed down firmly by passing a steel trowel carefully over it, makes a very clean-cut line. The chalk line is then taken

VIEW FROM OBSERVATORY, ROCKFORD PARK, WILMINGTON, DEL.

away. The walk should be rolled crosswise, not lengthwise.

Walks must be well protected for several days after laying, and ought to be frequently sprinkled in very hot weather, if exposed to the sun. Wooden covers are often used. Sprinkling is a benefit in all cases.

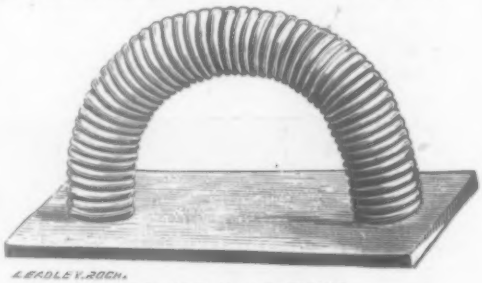
A very small steel trowel is useful in touching up bad spots. A bricklayer's trowel is the kind with which to cut joints. At the beginning of the day's work, a clapboard or a piece of tar paper three inches wide may be used against the walk laid last, or against any block that has been laid long enough to get very hard. Wet sand is good



BRONZE DOT ROLLER.

to place between a curbstone and cement walk, or against the stone walls of a house where a walk would otherwise touch them.

Very wide walks are laid in several courses, but it is bad practice to break joints; blocks ought not to contain more than forty square feet unless made extra thick in the middle.



BRONZE NAME STAMP.

It is better not to have more than thirty square feet in each block. Scantlings should not be removed until the day after the walk has been laid, and then rapped downward until loose, after which they may be carefully taken up.

Coloring matter should not be used in a cement walk; it may look very fine at first, but eventually fades, and then has a bad appearance.

Very fine, broken quartz is sometimes mixed with the sand in the top mortar of cement walks to improve their wearing qualities.

A name stamp may be used before the cement sets for marking the maker's name.

TAIL RACE IN PARK, WILMINGTON, DEL.

EDITORIAL COMMENT

A. S. M. I.
Franchise Values.
Cost of City Government, St. Louis.
Water-Works Associations.

A. S. M. I. The ninth annual convention of the American Society of Municipal Improvements will be held at Rochester, N. Y., on October 7–9. The program for the meeting will be found on another page. It shows that the usual valuable papers and discussions, for which this society is so favorably known, will be equaled in interest, if not exceeded. This society is one of the best working organizations whose field is that of municipal activities, and it is of special value to mayors, boards of public works, city engineers, superintendents of streets, water-works, lighting plants, as well as councilmen, city attorneys and other officials and city employes having to do with the construction of public improvements. The expense of membership for the city and of sending delegates is low and is fully repaid to it by the value of the information and the new ideas gained. The same is true for the individual who is eligible to membership though his city is not a member. Rochester has some interesting public improvements to exhibit and is in the midst of an interesting and instructive section which can be investigated during the trip. The meetings are never junkets, the members being interested in the work before them and applying themselves to it assiduously. Attendance at the Rochester meeting will be well worth while.

Franchise Values. An article by John Moody, editor of Moody's "Manual of Corporation Securities," shows by a concrete example the possible value of a franchise for the operation of a public utility, and uses his information in an argument to show the inequity of the present method of disposing of this value.

He traces the history of the lighting companies of New York, taking up the Edison Electric Illuminating Company of New York in 1898 when it controlled over 90 per cent. of the commercial lighting, and did all the city lighting on a capitalization of $6,500,000 in 5 per cent. bonds and $9,200,000 in stock, on which it paid 6 per cent., advancing to 11 per cent. by the end of the year. This capitalization was doubtless much greater than the actual investment under the most liberal provisions. A new company was then formed to consolidate all existing companies, issuing, for example, $21,000,000 in 4 per cent. bonds to pay the $9,200,000 capital stock of the Edison Company. After the consolidation was completed the total capitalization amounted to $76,150,000, an inflation of about 400 per cent. in three or four months.

That this was nearly all actual value of franchise and not simply expectation of future probable value was shown by the fact that very shortly the Consolidated Gas Company issued in exchange for the $36,000,000 of stock which was a part of this capitalization, its own stock to an amount having a market cash value of $29,730,060, which has since increased to a cash value of $37,163,000. At the same time the total cash value of the bonds was practically equal to their face value.

The total increase in market value of stocks and bonds was $54,800,000, about 70 per cent. of the total value of the property, all made in less than two years. Mr. Moody declares that this increase represents logically nothing but the values of the franchises. There were no patents of exclusive nature; the business is not gold mining, but simple furnishing of a definite service at rates authorized by the city which granted the company the right to charge them. His logic is good, and the speculator, the manipulator of the municipal legislature, the deceiver of the public is the one who benefits by this wholesale gift of the people's property.

The city has not only suffered this robbery but it continues to pay interest on the sums of which it has been robbed without complaint, for "rates can not be reduced, because otherwise we could not pay the interest on our bonds."

If the city had reserved the right to approve or disapprove of every increase in capitalization of any nature and had only per-

CLAYTON STREET BRIDGE, WILMINGTON, DEL.

mitted such increase for purposes of actual investment in material betterment or financial improvement, at the same time keeping the right to revise rates so that the interest on the invested capital should be reasonably liberal and not excessive, the city at large in its lighting bill, and the customers of the company would receive the benefit which belongs to them. The speculator would receive the amount due him for his investment of capital and ability and the inequitable excess of charges over value of service would not occur.

Were the service one open to free competition, the case would be different, and the rates could be left to take care of themselves, with one exception: but such service can be given economically only under a franchise granting a practical monopoly, and the capitalization and rates are logically under the control of the city granting the monopoly.

The one exception noted is the formation of a monopoly by means of a combination or "trust." Such a corporation being the creature of the state is logically under its control, but is not here under discussion.

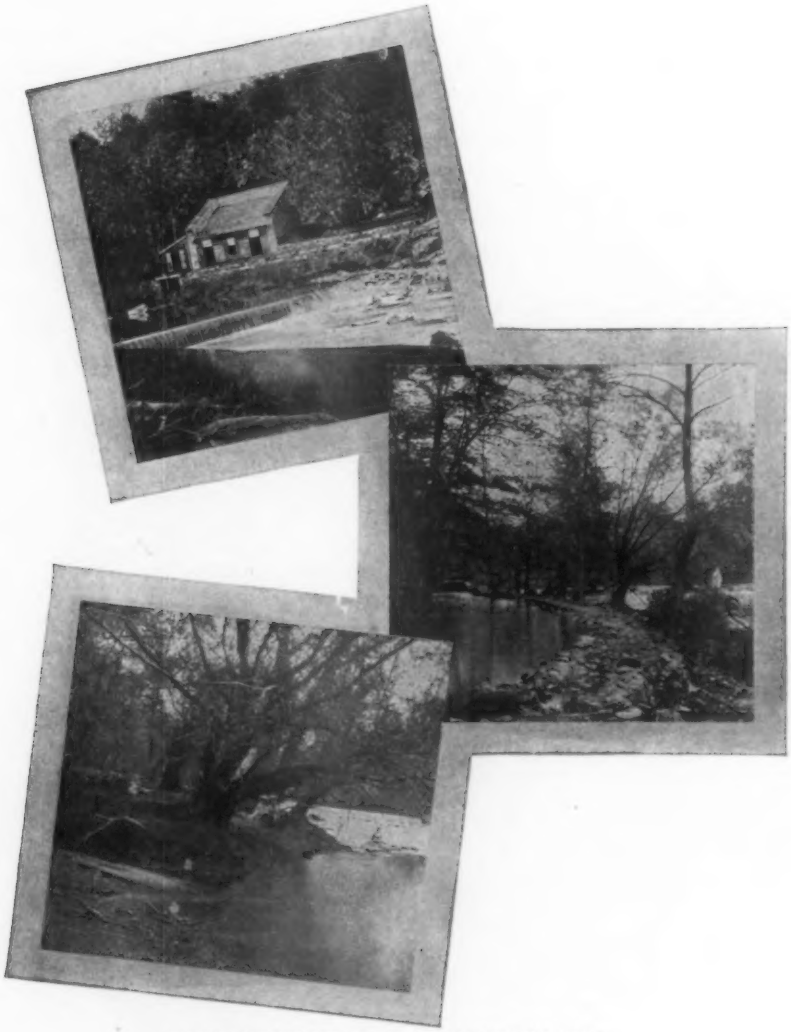
In the early history of our cities the value of franchises received little consideration, the present value of the improvements to the growing town completely obscuring the future evils of the absolute gifts then so frequently made, but experience should have taught its lessons and such wanton liberality should now receive a harsher name. The cities which are suffering from the mistakes of former administrations have a ray of hope in the recent decision in a lower court, that city councils do not have the right to alienate their power over municipal operations absolutely.

Water-Works Associations. This number of MUNICIPAL ENGINEERING almost deserves the title of a water-works number. The September meeting of the New England Water-Works Association had one of the most valuable of the many excellent programs given by that efficient organization, and the meeting of the Central States Water-Works Association shows promise of a similar working society intending to secure the highest benefits for its members and the profession at large. The full reports of the meetings in another department show their value to those interested in the subject, and give some indication of the benefits the members can derive from attendance.

The character of the technical societies of the country is gradually changing as the conditions change. A national society is usually the first development, the number of possible members being comparatively small, and the desire for interchange of experience and opinion being widespread but scattered. In such fields as that of water-works, the number of progressive men increases even more rapidly than the number of works, being rather in proportion to their growth of business, so that district associations are now finding that they have enough men to form a good working organization from those who are not attracted by a national society with its long travel and diversity of conditions, and with the aid of the members of the older society living in the same district are able to start with a full-fledged society. The New England society is one of the oldest societies of this kind, and serves as a model for many in other fields as well as its own. The Central States Society is one of the youngest, but the progressive spirit of the organization and the ability of its members already show in the character of the programs presented.

By restricting the district to works which are under the same general conditions, it is possible to make programs, practically every paper on which is of interest to every member, and thus each one is present and active at every session, giving a solidarity which produces enthusiastic support by words and works.

The Central States Association is making one experiment whose outcome will be watched with interest, as the principle involved is so different from that avowed in similar societies, whatever the actual practice may be. This is the giving of full membership privileges, including power to vote and to hold office, to the associate members, who are the firms manufacturing and dealing in water-works supplies. The society acknowledges its dependence for financial success upon the annual dues of its associate members, which are five times those of the active members, and for the ability to publish its annual volume of proceedings to the advertisers, who are largely the same firms, and this year it has extended the privileges of the associate members as stated. What the effect upon the organization will be is not clearly foreseen, as this is the first time such a society has so thoroughly combined the professional and the commercial in its organization. It is easy to predict the domination of the commercial ele-



IN BRANDYWINE PARK, WILMINGTON, DEL.

ment, as it will always be the most active and the most interested in pushing its cause, but it is also possible that it will see the benefit in the long run which will result from proper subordination to the technical section of the membership and thus foster the growth of the society and extend its benefits.

The character of the papers presented indicates the ability and the willingness of the members. If the officers will announce the program somewhat in advance of the convention and will thus enable preparation to be made for discussion, and will furthermore permit such discussion, the interest in the meetings beforehand and, therefore, the attendance should be materially increased. When the members do not know what is to be presented until the reader of the paper is on the floor, it is difficult to keep up the attendance at sessions as well as at the convention as a whole.

Cost of City Government, St. Louis.

An interesting comparison may be made between the cost of city government in Boston, as shown on page 172 of the September number of MUNICIPAL ENGINEERING, and in St. Louis. Complete records regarding the latter city are not at hand, but a comparison between the years ending in 1882 and 1902 may be made from some figures given in "Municipal Affairs," a journal devoted to municipal matters of St. Louis.

The population of St. Louis is estimated at 448,400 in 1882 and at 675,000 in 1902, being 451,770 in 1890 and 575,238 in 1900, according to United States census reports. If the population in 1902 has been overestimated, the costs per capita following should be increased for that year.

Police cost $1.08 per capita in 1882 and $2.40 in 1902, as compared with $2.52 to $3.13 for periods nearly the same in Boston, shown in the table on page 173.

The fire department cost $0.42 in 1882 and $1 in 1902, with Boston $1.68 to $2.29.

Parks cost $0.11 and $0.13 respectively, with Boston $0.19 to $0.43.

Lighting cost $0.62 and $0.76 respectively, not separated in the Boston accounts.

The supply of water including new construction cost $0.74 in 1882 and $2.21 in 1892. The amounts collected for water service were $1.65 and $2.28 respectively. These items were not included in the Boston statistics.

The total expenditures were $11.53 and $13.26 in St. Louis and $29.22 and $32.79 in Boston, but are not justly comparable, as apparently they do not include the same items.

The assessed valuation per capita was $428 in 1882 and $563 in 1891, as compared with $1,789 and $1,944 at almost the same dates in Boston. It should be noted that the decimal points should be removed in the last column of the table on page 173.

The same tendency to increase in expenditures per capita is noted in both cities. The increase in assessed valuation per capita is also evident, so that the increase in expenditures is more nearly proportional to the increase in wealth than it is to the increase in population.

Some interesting comparisons may be drawn between the two cities. For example: the assessed valuation of St. Louis per capita increased 15 per cent., while that of Boston increased but 9 per cent. St. Louis claims an actual increase still greater, since personal property increased but 31 per cent. in the twenty years, while real estate increased 52 per cent.

The increase in police and fire departments is in much greater proportion in St. Louis than in Boston, while the increase in expenditures for parks is much less.

It is to be hoped that the present tendency toward comparisons of this sort will greatly increase, for they show the weak spots in a city's management upon which attention and effort may be concentrated to bring them up.

IN BRANDYWINE PARK, WILMINGTON, DEL.

THE QUESTION DEPARTMENT

RELAYING CEMENT FLOOR.

The jail in this place requires a new cement floor, the old floor being badly cracked and showing signs of breaking in pieces. The large room is about 30 by 60 feet, with iron girders the narrow way of the room and steel arching between the girders filled with concrete to the top of the girders and a cement floor laid on top. I would like to know what kind of flexible joint to use between blocks six or eight feet square, so that the joints will be water tight and allow for expansion and contraction enough so that the floor would not crack again. Please give me the names of firms supplying this kind of material. *A. P. Wingate, Wellsboro, Pa.*

The method suggested for laying a similar floor under more trying conditions is described on page 167, vol. XXII (March, 1902), of MUNICIPAL ENGINEERING. It is probable that expansion and contraction is not entirely responsible for the cracking in this case, as the variation in temperature is not serious. Failures of floors are often due to defective workmanship, such as permitting the base to set so that the thin top does not join itself thoroughly to the concrete below. Vibration of the floor, shocks, and even slight expansion cause the separation of the top and disintegration is then easy. A block floor, independent of the base, if thickness and area of blocks are properly proportioned and the blocks are well bedded, should be free from the troubles of the continuous floor. The blocks may be laid as closely as possible and the joints filled with asphalt or similar water-proof material.

See the "Business Directory" in our advertising pages under the headings "Asphalt" to "Asphalt Sidewalks" for names of firms using or supplying materials suitable for the joints.

MARBLE DUST FOR CEMENT WALK.

We wish to know which will be the best way to use marble dust in facing cement walks to obtain white color, whether to mix dry with sand and cement or to sprinkle over walk and trowel in, and what amount to use.

Askin and Green Bros.,
Tecumseh, Mich.

The marble screenings should be mixed with the sand and cement for the top coat, which is presumably 1 to 1½ inches thick. A walk whose surface is all marble screenings and cement, with no sand, would not be as durable as one of ordinary sand and cement mortar, since it would wear faster than with sand and would also be more subject to the action of the weather. As little of the marble should be used as will give the desired color. If the proportions of sand mortar used are one of cement to one of sand, an amount of marble screenings equal to the amount of sand may be added if necessary, though the amount should be less if possible. If a mortar with higher percentage of sand is ordinarily used, the marble screenings should be substituted for a part of the sand.

One part of cement, one part of sand and one part of marble screenings will make a good walk. Reduction in the proportion of marble screenings will improve it, even if the proportion of sand is increased correspondingly. It is not advisable to sprinkle the marble dust over the walk and trowel it in. The surface may form a thin skin which will crack off, and if not, it will soon wear off, leaving the walk uneven in color, as the irregularity in travel will not cause uniformity in wear.

MATERIALS FOR CEMENT WALK.

On page 232 of your "Directory of American Cement Industries and Handbook for Cement Users," second edition, you have 011 for the quantity of cement in barrels to make a square yard of top and it should be 0.11, the remainder of the figuring being correct.

Taunton Construction Company,
Taunton, Mass.

The table referred to corrected is as follows, the cost per square yard of top finish of cement walk, 1 inch thick, being the quantity computed:

Cement 0.11 bbl. at $1.53	$0.168
Sand 0.22 cu. yd. at $1.02	0.022
Lampblack	0.008
Labor	0.149
Average cost	$0.347

The typographical error in dropping the decimal point in 0.11 will not mislead any one who carries the computation through, but should be noted. The average cost is $0.347.

We will thank the readers of the Directory for information of any other observed errors, typographical or otherwise, in any part of the book, and for suggestions that may lead to the improvement of future editions.

PATENTS ON CEMENT CURB AND GUTTER.

Can you tell me what patents, if any, are held on cement curb and gutter?

A. H. Gilbert, Columbus, Ind.

The best known patents on cement curb and gutter are the Parkhurst patents, mainly operated by D. C. Buntin of Indianapolis, Ind., shown on pages 126 and 200 of the "Directory of American Cement Industries and Handbook for Cement Users" ($5) and the Wainwright steel-bound concrete curb made by the Steel Protected Concrete Company of Philadelphia, shown in their advertisement on another page. A patent has recently been issued to S. B. Morss, Rahway, N. J., for a steel curb and gutter to be set with concrete base and backing. There are no patents on ordinary forms of curb and gutter made of ordinary materials, laid in the ordinary way, the patents covering special forms of cross-section, special methods of laying and special combinations of materials.

NON-STAINING CEMENT.

Can you give us any information regarding Lafarge cement or others for use in pointing the joints of a stone building?

Spaulding, Kimball & Co., Burlington, Vt.

Lafarge cement is a French product made from "lime of Teil" which is non-staining and is largely used where this quality is valuable. The Non-Staining Cement Company, of New York, are the agents for this country. Meier's puzzolan cement is a German slag cement which is non-staining. H. U. Frankel, Louisville, Ky., is the United States agent.

Blanc brand of non-staining cement is made by Charles Warner Company, Wilmington, Del. Its composition is not stated by the manufacturers, but is supposed to be somewhat similar to Lafarge. There are several slag cements made in this country, not all of which are non-staining. The Alabama Portland Cement Company, of Demopolis, is said to make a non-staining Portland cement. There may be other claimants of non-staining qualities for Portland cements made in this country. It is difficult to prove this quality in a cement in any way except long use.

Not all non-staining cements stand exposure to the weather, most of them requiring repointing at intervals.

The "Directory of American Cement Industries and Handbook for Cement Users" ($5) is the best source of information upon this subject, and all the above has been taken from that book, but two changes of address, which have been made since the book was issued. Much other valuable information on the subject will be found in the book.

MANUFACTURE OF PUZZOLAN CEMENT.

I have been experimenting on the manufacture of puzzolan cements from volcanic tufa and slaked lime. I have not been able to find any information on the modern process of manufacture of cement from these materials in any book. Can you refer me to any treatise on the subject, or give me any information?

What prices are American puzzolans commanding?

What are the fineness and tensile strength of some of them? ———, ———, *Cal.*

There are no factories in this country or any other English-speaking country using volcanic tufa for making cement. The process does not vary materially from that used in making puzzolan cements from slag. Descriptions of the process used in various American works will be found in the "Directory of American Cement Industries and Hand-Book for Cement Users" ($5). The process used by the Birmingham Cement Company is described on page 260; that of the Illinois Steel Company on page 280; that of the Maryland Cement Company on page 290; and that of the Southern Cement Company on page 305. A cement which may be classed as a true Portland cement, being made by the same process of artificial mixture, calcination and grinding, is made from limestone and slag by the Clinton Cement Company, as described on page 239 and by the Illinois Steel Company as described on page 280.

The simple process, the product of which is now classed as puzzolan, is merely a pulverizing of the slag or tufa and the slaked lime, and a thorough mixture of the two, either during the grinding or afterward. Chemical analysis will determine the proper proportions, which must be varied if the slag or tufa vary. A historical sketch of slag cement will be found on page 283 of Volume XX of MUNICIPAL ENGINEERING, which gives a general discussion of the characteristics of the cement and methods of manufacture. The manufacture from tufa would vary only in detail of handling.

The prices of cements at the present time are so uncertain that comparison of prices is scarcely possible. Quotations vary from day to day and times of delivery are placed far in advance. It is stated that ordinarily puzzolan is 30 or 40 cents a barrel less than Portland cement in price, but recent quota-

tions, subject to daily change, show a difference of 70 cents to $1.40, according to quality of the Portland cement and relative freight rates. The cost of puzzolan can be placed roughly as half way between natural and Portland cements at this time, but it is ordinarily nearer the upper figure. For any given locality the question of freight rates controls, and the general distribution of cement factories is rapidly reducing the question of sales of medium and low grades of cements to that of freight rates. With Portland cement prices in the same market varying from $2 to $2.75, and delivery uncertain, the impossibility of definite comparisons is evident.

A paper by Professor W. K. Hatt in the proceedings of the Indiana Engineering Society for 1900 (50 cents), from which the historical sketch above referred to was taken, gives the results of a number of tests of American slag cements made under his direction. The following table enables a comparison to be made between tests of slag cements and Portland cements given in Professor Hatt's paper and some tests of puzzolan from tufa reported in our correspondent's letter, from which the questions above are taken:

	Slag Cement. Lbs.	Portland Cement. Lbs.	Puzzolan from Tufa. Lbs.
Neat—			
1 day	193	.....	30 or less
7 days	404	375	100 to 150
28 days	477	531	170 to 200
60 days	519	.....	.....
90 days	507	.....	.....
1 cement and 1 sand—			
1 day	144	.....	.....
7 days	390	.....	60 to 103
28 days	403	.....	130 to 203
60 days	498	.....	.....
90 days	483	.....	.....
1 cement and 3 sand—			
1 day	39	.....	.....
7 days	163	122	.....
28 days	174	197	.....
60 days	208	.....	.....
90 days	217	.....	.....

Professor Hatt's paper also collects into a table a number of other tests of American and European slag cements and a number of chemical analyses.

It is generally considered that puzzolan cements should not be used in work exposed to the weather. They may vary in strength from that of natural hydraulic cements to that of Portland cements, according to composition of materials and care used in manufacture. If competition with Portland cements in the field open to puzzolan is desired, uniformity in strength and composition is an essential. Whether puzzolan from tufa will equal the slag cements will depend on the composition of the rock, its uniformity of composition and the care with which the manufacture is conducted. Whether the manufacture will be a commercial success will depend upon the demand for the class of product turned out, within freighting distance, and the relative cost of the puzzolan and natural cement, for one class of product and the relative cost of the puzzolan and Portland cement if a high strength puzzolan is produced. There may also be competition with natural cement in the latter case on account of the less proportion of puzzolan required for the same strength of mortar, even if the price per barrel is somewhat higher.

STRENGTH OF TRESTLE STREET CONSTRUCTION.

The city of Aberdeen, Wash., is built on a tide flat or marsh subject to overflow at high tides in winter and in June. The streets are either filled with sawdust or planked to a grade above high tide, about 3 feet above the general level of the land. The city council has an ordinance which provides that the streets shall be constructed as follows: Mud sills 3 inches by 12 inches are laid in the ground transversely to the street, 8 feet apart. Posts 6 inches by 6 inches are securely spiked to the mudsills four feet apart. On these posts is laid a beam 6 inches by 6 inches. Stringers 3 inches by 10 inches, spaced 3 feet apart, are laid from bent to bent, thus having a span of 8 feet. Floor plank 3 inches by 10 inches are spiked to the stringers with two 60d spikes on each stringer. The center of the street is to be 6 inches higher than the curb for a 60-foot street, 4 inches for a 40-foot street and 1 inch for each 10 feet for streets of less width.

How will the strength of the following construction compare with the above? Same mudsills, posts 4 inches by 6 inches, spaced 3 feet apart, thus coming directly under the stringers, and cap piece 4 inches by 6 inches.

Books give the crushing strength for yellow pine as from 12,600 to 19,500 pounds per square inch, which would give, with a factor of safety of 4, a safe load for a 4x6 inch post of 72,000 to 114,000 pounds, while a safe load for a 3x10 stringer of 8 feet span would be less than 5,000 pounds. I claim that a post 4x6 inches is ample for the beams used as stringers. The timber used is fir.

R. S. Jackson, Aberdeen, Wash.

So far as strength of new work is concerned either method of setting posts will give trestle bents stronger than necessary to carry the loads which the stringers can transmit to them, but the difference is not as great as that stated, for several reasons. First, as shown by government timber tests, the maximum strength of yellow pine is scarcely the lower of the results above stated, the average of the results given in Johnson's statement of the tests in his "Materials of Construction" is 8,000 pounds per square inch, and the minimum result in his series of tests is 3,400 for long leaf pine and 3,200 for white pine. The usual as-

sumption of 5,000 pounds as the breaking strength of pine is therefore not too low and should require careful selection of the timber to be used. Fir is perhaps ten per cent. weaker than pine. Then, too, green timber is materially weaker than well seasoned timber, but this weakness disappears with age, and a factor of safety of 5 for green timber will gradually increase to one of 8 as the timber seasons, provided decay does not set in.

In the second place the length of the post has a material effect upon its strength. Assuming 5,000 pounds per square inch as the crushing strength, and a factor of safety of 4, a short 6x6 inch block would carry 41,250 pounds load; if a post 3 feet long, the block would carry 35,100 pounds: and if 10 feet long, 15,450 pounds.

In the third place, the reduction in one of the horizontal dimensions affects the the strength more than the simple reduction in area. Thus the strength of a 4x6 inch post 3 feet long is 20,000 pounds. These figures are made on the assumption that Gordon's formula for the strength of columns best fits the results of experiments. If Johnson's formula is used the results for the two 3-foot columns would each be increased nearly 9,500 pounds. But he uses a factor of safety of 8, which would reduce the safe loads to about 22,500 for the 6x6, and 15,000 for the 4x6. There should be some extra factor of safety in the floor system on account of double effect on stringers of suddenly applied loads, but this will be more than offset by some extra factor of safety in the trestle bents on account of the alternations of wet and dry to which the posts are subjected, causing them to decay more rapidly than the floor system, requiring renewal at an earlier date if they do not have some extra material in them.

Lastly, the slight saving in timber by the second method of construction seems hardly enough to offset the extra handling and spikes necessary to put the posts in place.

The sufficiency of the floor system is not under consideration. It is doubtless satisfactory for the loads to be carried or its weakness would have been developed already.

POPULARITY OF BRICK PAVING.

In extension of the table on page 176 of the September number of MUNICIPAL ENGINEERING giving data regarding amount of brick paving laid in various cities in recent years, the following figures are given as taken from two tables in the new edition of Judson's "City Roads and Pavements": Certain data from the table above referred to are included for convenience in comparison, and to correct slight errors in the book tables:

MILES OF BRICK PAVEMENT IN USE IN CITIES.

City.	In Use June, 1894.	In Use Jan., 1899.
Albany, N. Y.	....	16
Atlanta, Ga.	1.1	2
Binghamton, N. Y.	0.25	2
Boston, Mass.	....	0.6
Buffalo, N. Y.	3.33	7
Cedar Rapids, Iowa	2	12
Chicago, Ill.	1	16.5
Cleveland, Ohio	....	66
Columbus, Ohio	30	78.22
Dayton, Ohio	6.4	12
Detroit, Mich.	9.6	24
Elmira, N. Y.	....	0.5
Erie, N. Y.	....	6
Fort Wayne, Ind.	2	10
Geneva, N. Y.	....	0.72
Gloversville, N. Y.	....	1.86
Grand Rapids, Mich.	....	3.24
Harrisburg, Pa.	....	0.5
Houston, Texas.	....	7
Indianapolis, Ind.	8.7	21.29
Jackson, Mich.	....	2.5
Joliet, Ill.	....	3.
Kalamazoo, Mich.	....	1.33
Little Falls, N. Y.	....	0.04
Mansfield, Ohio	....	15
Marion, Ohio	....	6
Milwaukee, Wis.	....	2
Minneapolis, Minn.	....	7.91
Nashville, Tenn.	....	2.1
New Haven, Conn.	....	1.5
New Orleans, La.	....	59
Pawtucket, R. I.	....	.12
Peoria, Ill.	7	19.3
Philadelphia, Pa.	20	120
Providence, R. I.	....	0.42
Richmond, Ind.	....	1.21
Rochester, N. Y.	3.14	6
Rock Island, Ill.	7	....
St. Joseph, Mo.	....	7
St. Louis, Mo.	....	24.77
St. Paul, Minn.	0.34	3
Sandusky, Ohio	....	6.5
Scranton, Pa.	0.1	2.93
South Bend, Ind.	....	12.0
Springfield, Ill.	5.38	....
Springfield, Mass.	....	1.37
Tampa, Fla.	....	2.4
Terre Haute, Ind.	1	3.5
Toledo, Ohio	16.33	42
Troy, N. Y.	1	8.5
Washington, D. C.	0.25	0.3
Williamsport, Pa.	....	3.7
Wilmington, Del.	3	1.24

A blank in the first column shows absence of report for 1894, but, especially in eastern cities, is with very few exceptions, an indication of the absence of brick pavements at that date.

CEMENT LINED RESERVOIRS.

Kindly refer us to published accounts and descriptions of cement lined reservoirs.

The Dow Chemical Co., Midland, Mich.

The concrete reservoir lining of the Forbes Hill reservoir at Quincy, Mass., is described on pages 135 and 180 of the "Directory of American Cement Industries and Hand-Book for Cement Users" ($5) and the details of cost of lining are given on page 230 of the same book. The same reservoir is described by C. M. Saville in a paper published in the proceedings of the New England Water-Works Association. On page 136 of the "Directory" is an illustration of the cement lining of the Albany basins. These are described in full in Hazen's "The Filtration of Public Water Supplies" ($3). There are concrete lined reservoirs also at Astoria, Wash., Manchester, N. H., Pasadena, Cal., and Syracuse, N. Y.

REGULATION OF AUTOMOBILES.

Will you kindly send me whatever information you may have upon the regulation of the driving of automobiles and motor-cycles in the streets of a city? We are considering an ordinance upon the subject. *Henry Mansfield, City Attorney, Peoria, Ill.*

Very few cities have passed special ordinances as yet upon this subject, most of them relying upon ordinances limiting the speed of vehicles and regulating lights, and those providing for licenses.

The following are samples of the methods of regulation adopted by various cities showing the variation in character of ordinances, the important parts of the ordinances only being abstracted or reproduced:

The Cincinnati ordinance of January 28, 1901, is practically a reproduction for automobiles of the bicycle ordinance of August 17, 1896, and requires a lantern, visible 200 feet, between sunset and sunrise, a bell or whistle at all times, to be sounded on approaching and crossing street intersections, speed not to exceed eight miles an hour, no two automobiles abreast except by special permission from superintendent of police, no interference with fire department or salvage corps, and fine not exceeding $5 and costs for violations of ordinance.

Cleveland requires numbered license tag costing $1, lamp on each side, not exceeding 7 miles speed within $\frac{3}{4}$ mile of Superior street viaduct and 15 miles outside this limit, stoppage on signal to allow horses to pass, bell or horn to be used when in danger of collision or accident, observance of "rules of the road," *i. e.*, turn to right to pass vehicles if going in opposite direction and to left if in same direction, fine not exceeding $50. The person registering the automobile must agree to furnish name of person other than himself operating the vehicle. The date of the ordinance is May 19, 1902.

Columbus, O., has a similar ordinance, dated June 16, 1902, the differences being that it does not require registration or tag, makes the maximum speed outside the central district 12 miles, and provides $5 to $50 fine or 30 days' imprisonment or both, for violation of speed requirement excepting by police or other city officer on duty.

Newark, N. J., is considering the passage of an ordinance reducing speed to 8 miles an hour and 4 miles in turning corners with $10 fine for first offense and $25 for each subsequent offense; light visible 100 yards from one hour after sunset to one hour before sunrise; bell, horn or whistle audible at least 100 feet, to be sounded on approaching foot passenger or vehicle; passing of vehicle going in same direction on left side, with $5 fine for violation; prohibiting congregation of such vehicles so as to interfere with free and uninterrupted use of streets by horses and carriages, with $5 fine for violation; registration showing name and residence of owner, number of registration to be painted on back of vehicle in color easily distinguished in figures at least 3 inches high, with $10 fine for violation; transfers to new owners to be applied for on penalty of $10 for failure; stoppage when signaled by drivers or riders of frightened horses and to exchange names and addresses in case of accident, under $10 penalty.

Chicago has a very comprehensive ordinance, passed July 6, 1899. It defines the term automobile in detail, including all vehicles using other than human or animal muscular power for propulsion, except those authorized to run on tracks in the streets. A board of examiners is appointed, consisting of the city electrician, the commissioner of health and the city engineer, who shall on at least two days in each month hold examinations of the qualifications, ability and capacity of persons desiring license or certificate of qualification to operate such vehicles, physically, mentally and by education, under rules and regulations adopted by itself. Capable applicants may receive license for one year from date of issue on payment of $3, renewals without further examination being issued each year on payment of $1. The board signs all licenses and has the power to revoke temporarily for carelessness, intemperance, or other just

cause, and to revoke for a limited period or permanently, after a hearing and opportunity for presentation of defense. Details of operation of board and its secretary are given. Speed is limited to 8 miles an hour and observance of the rules of the road is required.

Gongs not less than 4 inches in diameter must be used and brakes of sufficient power to stop within 10 feet from a speed of miles an hour must be provided, also lighted lamp or lamps after dusk and before dawn. Penalty for failure to procure license before operating automobile subjects offender to fine of $5 to $25 for each offense. The report of the board for the first year shows 377 licenses issued, applicants appearing at all the weekly examination dates but three. Eight licenses were refused and one was revoked. Several failed on first examination and were afterwards passed. Reports of accidents are required from the operators involved and fourteen of these reports are printed. Applicants are required to have good use of both hands, arms, feet, and legs, good eyesight, with spectacles, if used, securely fastened to head by spectacle frame. They must not be color blind, dipsomaniacs, subject to fainting spells, or of reckless disposition and must be free from epilepsy or heart disease. Drivers of steam, gasoline and electric vehicles have different examinations as to their practical mechanical qualifications, and theory is not considered.

At Freeport, L. I., the district attorney adopted some novel measures for diminishing the nuisance due to rapid running of automobiles and motor-cycles. He arranged a measured quarter-mile, posted policemen at each end, with signals from one end at the moment a vehicle passed it. If it reached the other end at a greater rate of speed than 8 miles an hour the driver was arrested. If he refused to stop, another signal to a furniture van stationed a short distance up the road caused it to draw across the track-way so that the motor vehicle was compelled to slow down or stop, enough to put the driver under control. The first fines assessed were $5 to $15, but warnings were given that second offenses would result in the full fine of $50, with possible imprisonment. The speed limits in this district are 8 miles in the villages and 20 miles in the country.

Hackensack, N. J., has reduced the speed of automobiles from 12 miles to 8, and increased the fine to a possible $50, with alternative or addition of imprisonment up to 20 days. Teaneck township makes the punishment for a second offense $100 fine or 90 days in jail, or both. Bloomfield imposes $20 fine with 30 days' imprisonment if not paid. These are all New York suburban districts in which the reckless operation of pleasure vehicles has become an unbearable nuisance.

COST OF CITY GOVERNMENT.

I am interested in an article in the September number of MUNICIPAL ENGINEERING on page 172 on "Cost of City Government," and do not understand the last two columns of the table on page 173. Will you explain them? *George E. Sawyer, Fairmont, Minn.*

The last column but one in the table referred to gives the total per capita expenditure for all purposes in the city of Boston. It is obtained as follows: The total expenditures for each year for all city purposes and the population in each year are given in Special Publication No. 5 of the Boston department of statistics. For the five-year periods, the average expenditures per year and the average population for the five years are computed. Division of the average expenditures by the average population gives the average expenditure for the five-year period per capita of population. It is equal to the sum of the items on the same line in the preceding columns, which were computed in a similar manner.

The last column is entirely independent of the remainder of the table. It is intended to give the assessed valuation per capita, i. e., the proportion belonging to each inhabitant if the entire value of property in the city were divided equally among the population. The average assessed valuation on May 1 is given for each year in the special publication referred to. The average for a five-year period, divided by the average population for the same period gives the assessed valuation per capita. A typographical error in setting the table was overlooked in proofreading and the valuations given in the last column of the table should be multiplied by 100. The assessed valuations per capita in Boston for the periods named should therefore be as follows:

5-year periods.	Assessed valuations per capita.
1870–75	$2,444
1875–80	1,984
1880–85	1,789
1885–90	1,794
1890–95	1,893
1895–1900	1,944
15-year periods.	
1870–85	2,038
1885–1900	1,882

For the purposes of the article the error was not serious as the column as given

showed the proportionate increase in assessed valuation in the last fifteen years and gave the ground for the statement that a comparison of expenditures with assessed valuations would show that the increase in expenditures is more nearly proportional to the increase in assessed valuations than it is to the increase in population.

See also the article on Cost of City Government in St. Louis under "Editorial Comment."

MAINTENANCE OF FIRE DEPARTMENTS.

Can you give us some statistics of the maintenance of fire departments in cities? The population of Vicksburg in 1900 was 14,834.

J. G. Cashman, Vicksburg, Miss.

The following table gives statistics bearing upon the maintenance of fire departments, derived from reports to western firemen's associations and other records in this office, selecting the cities of over 10,000 population:

City.	Population, 1900.	Ownership of Water-Works.	Miles of Mains.	No. of Hydrants.	Value of Water-Works.	No. of Fire Companies.	No. of Chemical Engines.	No. of Fire Extinguishers.	No. of Engines.	No. of Hose Carriers.	Hook and Ladder Trucks.	No. of Men.	No. of Volunteers.	No. of Horses.	No. of Feet of Hose.	Value of Buildings.	Value of Appliances, Including Horses.	Annual Expenditures.	Fire Alarm System.
Atchison, Kan.	15,722	Co.	23	153	.....	....	1	6	2	2	2	11	†0	8	7,420	$8,000	$17,340	87,429	Telephone.
Aurora, Ill.	24,147	City	49	430	815,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40,000	70,000	.....	.....
Carthage, Mo.	9,416	Co.	17	80	.....	.....	.....	.....	.....	1	1	.....	.....	.....	1,000	.....	.....	.....	Bell.
Champaign, Ill.	9,098	Co.	32	200	100,000	2	....	4	1	1	1	20	20	4	2,000	.....	.....	.....	.....
Decatur, Ill.	20,754	City	15	157	200,000	2	2	....	1	2	1	22	0	16	.....	.....	.....	.....	Gamewell.
E. St. Louis, Ill.	29,655	Co.	40	230	.....	.....	.....	.....	8	3	1	25	.....	11	4,000	.....	15,000	.....	.....
Evanston, Ill.	19,259	City	48	368	400,000	.....	1	.....	1	2	1	15	.....	.....	3,500	.....	.....	.....	.....
Fort Scott, Kan.	10,327	Co.	18	177	.....	.....	1	3	.....	2	1	6	0	4	1,750	2,000	8,045	3,881	Gamewell.
Freeport, Ill.	13,258	Co.	20	124	125,000	.....	1	4	.....	2	1	9	.....	.....	.....	.....	4,000	.....	.....
Galesburg, Ill.	18,607	City	.....	251	200,000	.....	1	2	.....	2	1	.....	.....	7	3,000	5,000	.....	9,000	.....
Joliet, Ill.	29,353	City	25	150	300,000	5	3	209	3	27	1	30	.....	.....	6,000	.....	.....	.....	.....
Joplin, Mo.	26,023	Co.	24	220	.....	.....	2	15	.....	1	1	9	0	6	4,000	2,000	6,000	7,500	Elec. bell.
Kankakee, Ill.	13,595	Co.	16	136	169,000	4	.....	.....	.....	3	1	38	?	8	2,750	.....	.....	.....	.....
Kansas City, Kan.	51,418	Co.	29	350	.....	.....	2	14	1	7	2	46	0	21	15,000	42,000	17,900	41,000	Telephone.
La Salle, Ill.	10,446	City	18	98	150,000	2	.....	.....	1	2	3	.....	.....	.....	1,500	.....	.....	.....	.....
Mattoon, Ill.	9,622	Co.	.....	84	.....	.....	.....	.....	.....	.....	1	33	?	.....	2,500	.....	.....	.....	.....
Moline, Ill.	17,248	City	18	188	50,000	3	.....	.....	.....	3	1	21	?	7	4,500	.....	.....	.....	.....
Ottawa, Ill.	10,588	City	25	152	160,000	.....	.....	.....	1	1	1	24	?	4	2,000	.....	.....	.....	.....
Peoria, Ill.	56,100	Co.	84	1,015	300,000	.....	.....	.....	.....	.....	.....	57	add'l	57	.....	.....	60,000	75,000	.....
Pittsburg, Kan.	10,112	Co.	18	117	.....	.....	.....	.....	.....	2	1	?	part	.....	2,000	.....	1,000	.....	.....
Springfield, Mo.	23,267	Co.	59	251	475,000	.....	.....	4	.....	4	2	15	0	11	4,000	1,500	19,100	12,500	Gamewell.
Topeka, Kan.	33,608	Co.	45	322	725,000	.....	2	27	1	6	1	29	0	18	27,000	105,000	29,200	27,000	Gamewell.
Webb City, Mo.	9,201	Co.	12	103	120,000	.....	.....	4	.....	2	.....	10	†6	3	1,000	10,000	4,600	1,575	Telephone.

† Also four paid for part time in Atchison, two in Webb City.

ACCOUNTING SYSTEMS FOR WATER-WORKS.

I understand that some time ago you conducted a competition upon accounting forms for water-works, and in that case you can undoubtedly give me the names of plants having up-to-date systems.

R. W. Waite, President Indiana Water Co., New Albany, Ind.

The competition for the best forms of office blanks and accounting forms for the use of water-works companies was held in 1896 and 1897. The first prize was awarded by the committee to D. H. Maury, Jr., of the Peoria Water Company, Peoria, Ill., for the most complete set of forms offered. The second prize was awarded to J. R. Gray, of the Whitewater Water-Works Company, Whitewater, Wis., for the best set of office records, and the third prize was awarded to F. H. MacPherson, of Windsor, Ont. Special mention of particular features was made of the Denison Water-Works, Denison, Tex.; The Winnipeg Water-Works Co., Winnipeg, Man.; The Mattoon Clear Water Co., Mattoon, Ill.; Dow R. Gwinn, Quincy, Ill.; Water Commissioners, Troy, N. Y.; Water-Works, Salt Lake City, Utah; Water-Works, Battle Creek, Mich.; Water Registrar, Melrose, Mass.; Shreveport Water-Works, Shreveport, La.; Danville Water Company, Danville, Ill. Many of the forms presented were given and explained in the numbers of MUNICIPAL ENGINEERING MAGAZINE in 1897 and 1898, and an expert accountant was employed to prepare a set of forms suitable for the use of small water-works as none of the sets presented were suitable throughout for this class of works. The set of books and the card system thus developed have been copyrighted by Municipal Engineering Company, and are now manufactured and for sale by it.

Among Indiana works the Indianapolis Water Company may be mentioned as having a very good system; also the Muncie

water-works, under the management of the American Water-Works and Guarantee Company of Pittsburgh. Mr. Dow R. Gwinn is now in charge of the water-works at Terre Haute, Ind., and doubtless has as modern methods of accounting as those on which he received a prize while at Quincy, Ill. There are doubtless others with which the writer is not acquainted.

SLOW SAND FILTRATION.

I understand there has been a work recently published on slow sand filtration. If so, will you kindly advise me where I can get a copy of the same?

Jas. McNeen, La Junta, Colo.

Hazen's "The Filtration of Public Water Supplies" ($3) is probably the best work upon slow sand filtration in the English language. Fuertes's "Water Filtration Works" ($3.50) is another good book upon the subject. Each book has a chapter or two on mechanical filtration also.

Fuller's "Water Purification at Louisville" ($10) and the official reports of the experiments at Cincinnati, Pittsburg and Washington on slow sand and mechanical filtration are valuable reports of actual work under particular conditions. Hazen's book is the best one for a beginning of the study and gives a good view of the whole field in sufficient detail for most purposes.

SYSTEMS OF WATER FILTRATION—SEWAGE POLLUTION OF SMALL STREAMS.

The stream from which a water supply is taken runs through a sand bed for miles with no contamination from towns or otherwise, and it is approximately pure already. Which would be preferable—a pressure filter, or pumping the water twice and installing the gravity type?

A twelve-inch sewer outfall empties into a small running stream, 300 yards below a residence, the owner of which is suing the city for damages, claiming that the odor and contamination have caused sickness in his family, especially typhoid fever. There are 20 or less sewer connections in this district and a clear running stream of water through the sewer at all times. Is his contention well founded from the standpoint of the sanitary engineer?

James Hamilton, Jr., Chester, S. C.

The relative values of the gravity and pressure types of mechanical filters are well stated in the second column on page 82 of MUNICIPAL ENGINEERING for August, 1902, in an article by Robert E. Milligan, who has had long experience in the installation of mechanical filter plants. In this particular case it would seem that the filter is desired only to remove floating matter from the water when the stream is in flood. If this is true, the preliminary sedimentation described by Mr. Milligan in his article may be desirable, and may necessitate pumping into the settling basin, in which case the gravity type can be used. If there is no serious contamination to remove, the variation in results in the pressure filter may not be objectionable, but if there is much sediment, frequent cleaning of filters will be necessary. The case will then reduce to a comparison of the cost of settling basin and pumping to it, and the excess of cost of operating and cleaning the pressure filters over that of operating and cleaning the basin and the gravity filters. This question can only be decided by one who knows the conditions by observation, but it may require an expert in making such observations.

The stream pollution case is also one in which a definite opinion can not be given without personal investigation, and the opinion of one who has had much experience in this class of inspections is far more valuable than that of a theoretical sanitarian, whether physician or not. The character of the sewage, the proportion of dilution by the stream, the manner of flow in the stream below the sewer, the direction of winds, etc., all have their effect upon the production of a nuisance and the amount of objection that can be sustained. The production of typhoid fever above the sewer outlet might be difficult to prove. The trained observer can usually show the possibilities and impossibilities in a particular case after a careful inspection of the existing conditions.

WOODEN PIPE FOR IRRIGATION DITCHES.

I would like some information in regard to building wooden pipe for carrying water for irrigating land. I wish to build from 2 to 8 miles of pipe of 12 to 20 inches diameter. Can I do better in price than the hydraulic miners are doing? That is too costly for farming purposes.

F. E. Hayden, Granite, Colo.

In a paper before the American Society of Civil Engineers, Mr. A. L. Adams discusses the manufacture and use of stave pipe. The data he gives are used in Turneaure and Russell's book on "Public Water Supplies" ($5), and also in Folwell's "Water-Supply Engineering" ($4). In Chicago he estimates stave pipe to carry 25 feet head of water, 12 inches in diameter, to cost 42 cents a foot laid, and in San Francisco 37 cents. Eighteen-inch pipe costs 69 cents and 58 cents respectively. For pipe strong enough to carry 200 feet head, 12-inch pipe costs 85 and 94 cents in Chicago and San Francisco respectively, and 18-inch pipe

$1.46 and $1.47. The general method of using stave pipe and open channels made of staves in semi-circular form is shown in Newell's book on "Irrigation" ($2), a review of which will be found elsewhere in this number of MUNICIPAL ENGINEERING. This is a very valuable book for any one interested in its subject.

While an irrigation system all of wooden pipe would probably cost too much for the product of the farms unless high-priced crops were raised on land suitable for them and near a market, a combination of ditches in earth and ditches of half stave pipe construction, with full stave pipe only to carry water through depressions difficult to surround with the ditch, would possibly be within reach of the product of the land to be irrigated. Cement is used to line ditches in bad ground where it can be obtained at a low price.

BOOKS ON OPERATION OF ELECTRIC LIGHT PLANTS.

What are the latest and best books on electricity covering the operation of electric light plants, etc.? *E. Seybolt, Geneva, N. Y.*

Atkinson's "Elements of Electric Lighting" ($1.50) treats of the dynamo, the storage battery and the principles of direct and alternate current lighting. Crocker's "Electric Lighting" ($3) treats of the installation and operation of electric lighting plants, including buildings, engines, power transmission, dynamos and their practical management, accumulators, switch-boards, and other appliances. Guy's "Electric Light and Power" ($2.50) gives the results of years of practical experience in the central-station work. Crocker & Wheeler also have a book on "The Practical Management of Dynamos and Motors" ($1).

RESERVOIR FOR ARTESIAN WELL SYSTEM.

A village with 1,200 inhabitants gets water from five 6-inch flowing wells, mostly from one, as the overflow is very small. In case of fire only one stream can be used. If a concrete reservoir is built 22 feet deep by 20 feet in diameter around the best well and the pipe is cut, say 16 feet down from the surface, would that give sufficient water? Would reservoir walls 2 feet thick be strong enough, the ground being ten feet of quicksand and below that clay? What would it cost and what would a small standpipe cost? *W. F. Ernst, Port Huron, Mich.*

These questions can only be answered definitely by an experienced engineer after a careful study on the ground of the conditions. A statement of the general principles upon which the decision would be based may be in place here.

An artesian well may be increased in flow by cutting off the pipe. Thus at Canton, Ill., the water would stand in a pipe 15 feet above the surface of the ground. If the pipe was removed down to the ground surface, the well would discharge 45 gallons a minute. See "Water Supply for Small Cities" on page 180 of the September number of MUNICIPAL ENGINEERING. It is probable that if the pipe had been tapped 15 feet below the surface it would have yielded nearly or quite 90 gallons a minute, though all wells do not increase their flow proportionately to the distance of the top of the well below the point at which the well would stand full without overflowing if pipe were extended to that point. A few experiments would determine the improvement in flow by cutting off the pipe and the advisability of making the reservoir proposed. It would be well to cut off the well near the bottom of the reservoir to get all the advantage possible from its flow. If the top of reservoir is high enough above the well, and no water is drawn, the water will find the level at which its pressure is zero and there will be no further discharge from the well. When the reservoir is pumped out for fire delivery or other purpose, the water will begin to flow from the well and as the level of water in the reservoir is lowered the flow of water from the well will increase until, finally, if the well has sufficient capacity, the inflow will equal the outflow by pumping and then the water will remain at a fixed level until the rate of pumping is changed. It is evident that the size and shape of reservoir needed depend upon the flow of water from the well at the depth proposed and upon the rate at which it is desired to pump it out, one of which must be determined by experiment and the other from the number and size of fire streams desired. The questions of strength and cost should be submitted to an engineer who can inspect the ground. Some idea of them may be derived from the fact that a well at Addison, New York, 12.5 feet in diameter and 23 feet deep, was dug in clay and mill refuse with sand and gravel for 3 or 4 feet near the bottom, and lined with a wall of stone laid in cement, 20 inches thick, for a total cost of $851.

MUNICIPAL MATTERS IN COURT

The Higher Courts—Meter Rent—Power Brakes—Gas Waste.

Abstracts from Decisions of the Higher Courts.

Prepared by Andrews & Murdoch.

Abandoning Improvement.—Power of a city to abandon an improvement, which has been commenced, and to abolish the improvement, except a settlement of outstanding debts, where no vested rights are violated, may be implied from Sand. & H. Dig., sec. 5,329, providing if, for any cause, the improvement shall not be made, the costs shall be a charge on real estate in the district, and shall be raised by assessment. Board of Improvement of Morrilton Water Works Improvement Dist. vs. Earl et al., 69 S. W. Rep. (Ark.) 577.

Cellar Door Opening on Sidewalk.—A cellar door occupying two-fifths of the width of the sidewalk must be regarded as so far a part of the public highway as to require the property-owner to maintain it in such condition as to be reasonably safe for such lawful use as the public may find necessary or convenient. Snader vs. Murphy, 19 Pa. Super. Ct. 35.

Change of Grade.—Where a city adopts an ordinance changing a street grade, and thereupon damages are assessed in favor of an abutting property-owner, but such damages are not paid, and thereafter the city grants a railroad company right to lay tracks in the street conforming to the new grade, the property-owner cannot enjoin the laying of such tracks on account of the non-payment of his damages, where it appears that the railroad company intends to lay the tracks at the old grade, and that, if so laid, the property-owner will not be injured. Aetna Iron Works vs. St. Louis Transit Co., 69 S. W. Rep. (Mo.) 6181.

Defective Sidewalks.—The duty ordinarily resting on a city to maintain its streets and sidewalks in a reasonably safe condition for travel in the ordinary mode is remitted during the time occupied in making repairs and improvements. City of South Omaha vs. Burke, 91 N. W. Rep. (Neb.) 562.

Ordinary Care of Streets—A municipal corporation is bound by law to use ordinary care and diligence to keep its streets and sidewalks in a reasonably safe condition for public use in the ordinary modes of traveling, and if it fails to do so it is liable for injuries sustained by reason of such negligence; provided, however, that the party injured exercises ordinary care to avoid the injury. Ordinary care, as applied to personal injury cases, means that degree of care and caution which might reasonably be expected from an ordinarily prudent person, under the circumstances surrounding the party at the time of the injury; and this is a question of fact for the jury to determine. Town of Norman vs. Teel, 69 Pac. Rep. (Okl.) 791.

Paving Resolution—A paving resolution permitting the superintendent of streets to use either class A or class B rock in certain gutters is not invalid, when the two classes of rock are of the same material, and only differ in density, and the cost is the same, or, if different, is equalized by the situation of the rock or cost of quarrying. Lambert vs. Marcuse et al., 699 Pac. Rep. (Cal.) 620.

Platting for Purposes of Taxation—The platting of tracts of land lying within an incorporated city or village for the purpose of taxation is not such a laying out into city or village lots or blocks as is contemplated by Rev. St. c. 24, sec. 206, authorizing the disconnection of territory, but is simply for the purpose of affording the assessor an opportunity to describe it without difficulty. Gilbert vs. Morgan, 98 Ill. App. 281.

Space Beneath Sidewalks—A municipal corporation may authorize the use of space underneath sidewalks, provided it does not, by doing so, infringe the use of the street in all its parts by the public; but it has no right to authorize the use of any part or portion of the sidewalks of the city for private purposes. Heineck vs. Grosse, 99 Ill., App. 441.

Use of Steam Rollers—A city as well as its contractors has the right to use steam rollers with due care in improving streets, and also the right to temporarily leave such rollers, properly guarded, in some appropriate place on the street while the work progresses. City of Elgin vs. Thompson, 98 Ill., App. 358.

Charge for Meter Rent Upheld.

A decision was handed down by Judge White in special term of the New York supreme court Sept. 9 on the application

of Buffalo for an injunction restraining the Buffalo Gas Company from imposing and collecting the so-called meter charges. Judge White denies the application, but does not file any reason for the denial, although his decision was in a way clearly anticipated. In a recent hearing of the argument the counsel for the gas company set forth that the company imposes the charges not as meter rent, but to reimburse itself for wages paid in carrying on its books the names of the people who have meters in their houses but do not use gas; also for an inspection of the meters and other work. Corporation Council Feldman claimed that the action of the company in putting up this argument was an evasion of the law. At the close of the hearing Justice White remarked that he failed to see what connection the city had with the matter to entitle it to an injunction.

Power Brakes Required on Detroit Railway.

A decision was handed down by Judge Phelan in the recorder's court at Detroit, Mich., Sept. 12, upholding the ordinance requiring the street railway company to operate its cars with electric or air brakes. He found the street railway company guilty of violating this ordinance and imposed a fine of $50. Judge Phelan said:

The point was made and is still insisted upon by the respondent that this ordinance is ultra vires and beyond the corporate power of the city of Detroit to enact municipal legislation, and this may be true unless this municipal legislation can be supported as a just exercise of police power to protect the lives and limbs of its citizens and sojourners within its limits from undue risk. If this ordinance has a tendency to preserve life and limb and avoid deplorable accidents in any considerable degree it is my duty to sustain it, and I believe this will be the effect.

The case will be appealed to the state supreme court.

Natural Gas Waste.

Judge Paulus of the circuit court, Marion, Ind., rendered a decision Sept. 17 holding that the Indiana gas waste law does not apply to waste of gas where the gas is used as a force to operate machinery; that the law was framed at a time when gas wells were turned loose through the Indiana gas field and the gas permitted to escape with full force and unhindered for days at a time. Judge Paulus stated that the statute, if enforced in the case on trial, might forbid the use of gas as fuel. The law related to the reckless waste of gas, but did not define in what manner it should be used—whether for heat or power.

THE AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS

Convention of October 7-9, 1902.

The following program for the ninth annual convention of the American Society of Municipal Improvements to be held at Rochester, N. Y., Oct. 7, 8 and 9, shows good work by the president and secretary, well seconded by the members of the society and others:

First day, Tuesday, Oct. 7, 1902—10 a. m., meeting of the executive committee at Powers hotel; 10 a. m. to 12 m., delegates will report at the headquarters, Powers hotel, for registration, etc.

Afternoon session, 2 o'clock, at Chamber of Commerce—Address of welcome on behalf of the city of Rochester by His Honor Mayor A. J. Rodenbeck and on behalf of the Chamber of Commerce by the Hon. Henry C. Brewster, president. Response by the vice-president, G. M. Ballard of Newark, N. J., regular order of business, including reports of officers and executive committees and election of members.

Report of committee on municipal data and statistics by Charles Carroll Brown, M. Am. Soc. C. E., chairman, Indianapolis, Ind., editor of Municipal Engineering Magazine.

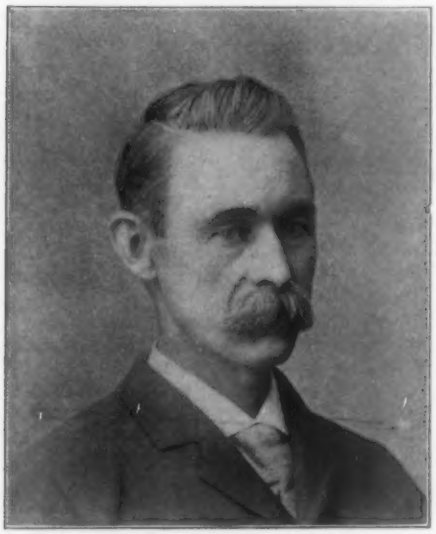
Report of committee on municipal franchises by Robert E. McMath, chairman, consulting engineer, St. Louis, Mo.

Paper on the same subject by William S. Crandall, editor Municipal Journal and Engineer, New York.

Report of committee on taxation and assessment by August Herrman, chairman, chairman of water commission, Cincinnati, O.

Evening session, 8 p. m., at Chamber of Commerce.

Brief talks descriptive of Rochester and its public works, illustrated by stereopticon, including a general description by



PRESIDENT E. A. FISHER, ROCHESTER, N. Y.

J. Y. McClintock, commissioner of public works; the water supply by John F. Skinner, assistant engineer; water and electricity distribution by W. N. Radenhurst, assistant engineer; pavements and sewers by W. J. Stewart, assistant engineer; the street railway system, by R. E. Danforth, assistant general manager; improvements in electrical conditions, by J. E. Putnam, electrical engineer.

Report of committee on parks and park development by G. A. Parker, chairman, superintendent of parks, Hartford, Conn.

"Rochester Parks," by C. C. Laney, superintendent of parks, Rochester.

Second day, Wednesday, Oct. 8, 1902. Morning session, 9:30 a. m.

Report of committee on sewerage and sanitation by A. P. Folwell, chairman, consulting engineer, Easton, Pa. Subject "Municipal Sanitation."

"Residential Septic Tanks," by Burton J. Ashley, C. E., Chicago, Ill.

"The Biological System of Sewage Disposal," by John N. McClintock, C. E., Boston, Mass.

"Sewer Maintenance; Under Whose Supervision and Why?" by John H. Emigh, city engineer, North Adams, Mass.

"Practical Operation of Sewage Purification Plants," by John W. Alvord, consulting engineer, Chicago, Ill.

"Description of Interesting Sewer Construction in Brooklyn, N. Y.," by Henry R. Asserson, C. E., Brooklyn.

Report of committee on disposition of garbage and street cleaning by John H. Emigh, chairman, city engineer, North Adams, Mass.

Paper on "Street Cleaning," by J. Herbert Grant, C. E., Rochester, N. Y.

Report of committee on city government and legislation by John Sterling, chairman, Burlington, Ia.

Election of officers and selection of next place of meeting.

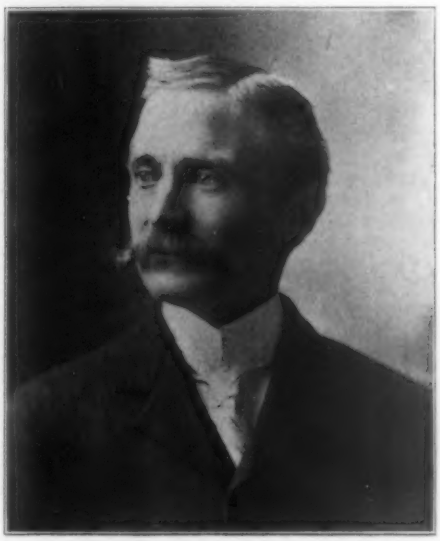
The afternoon will be occupied by a tallyho ride to view points of interest in the city of Rochester, including some of the good roads built by the state of New York. The evening will be occupied by a banquet at the Powers hotel.

Third day, Thursday, Oct. 9, 1902. Morning session, 9:30 a. m., at Chamber of Commerce:

Report of committee on electric street lighting by Charles H. Rust, chairman, city engineer, Toronto, Canada (statistics relative to cost of street lighting in various cities).

"The Economic Theory of Municipal Lighting," by Nicholar S. Hill, jr., consulting engineer, New York City.

"Electrical Government," by A. S.



SECRETARY GEO. W. TILLSON, BROOKLYN, N. Y.

Hatch, president International Association of Municipal Electricians, Detroit Mich.

Report of committee on water works and water supply by Morris R. Sherrerd, chairman, chief engineer of water works, Newark, N. J., and George H. Benzen-

berg, consulting engineer, Milwaukee, Wis.

"Specifications, Testing, Installation and Care of Water Meters," by George A. Hotchkin, superintendent of water works, Rochester.

Afternoon session, 2:30 p. m.:

Report of committee on review by Prof. A. N. Talbot, chairman, Champaign, Ill.

Report of committee on street paving by Nelson P. Lewis, chairman, chief engineer board of estimate and apportionment, New York City.

"Work of the New York Highway Commission," by the Hon. Edward A. Bond, state engineer and surveyor, Albany, N. Y.

"Work of the Massachusetts Highway Commission," the Hon. W. E. McClintock, chairman.

"Cost of Pavements and Roads in

TREASURER F. J. O'BRIEN, OSWEGO, N. Y.

Small Towns," by Emmet J. Steece, city engineer, Burlington, Ia.

"Pavements Injured by Water, How to Minimize the Injury," by J. W. Howard, C. E., New York City.

Evening session, 8 p. m., at Chamber of Commerce:

"A Year's Experience in Laying Bituminous Macadam," by Fred J. Warren, New York City.

"Goods Roads, Twice as Long, at No Extra Cost if Free of Politics, Illogical Theories and Too Technical Engineer," by Senator Earle of Michigan.

The subject of good roads under this committee is of special interest in Rochester, as the state of New York at the present time has twelve roads or sections of roads now under contract in the county and near to the city, ten of which are being worked, amounting to 48½ miles; six roads in the vicinity amounting to 14¼ miles have been completed, making a total mileage of good roads built, or under construction by the state of New York, of 62¾ miles. In nearly every instance these roads start at the end of trolley lines and are thus available for inspection by any who desire to do so.

Thursday afternoon the ladies and guests will enjoy a street car ride about the city, through the courtesy of the Rochester Railway Company.

The headquarters of the society have been located at Powers hotel, situated on Main-st., opposite the court house and city hall. The rates of this hotel are as follows: American plan, $3.50 to $4.50 per day; European plan, $1.50 to $2.50 per day.

There are also a number of other good hotels to provide amply for the delegates.

The sessions of the society will be held in the rooms of the Chamber of Commerce, a short distance from the hotel.

Round trip rates on the certificate plan will be one and one-third single fare one way provided one hundred delegates present the certificates, so everyone attending should secure the certificate when purchasing his ticket.

The common council has appointed a committee of six aldermen to act as a reception committee, the Rochester Engineering Society has also appointed a committee of five to act in a similar capacity, and the Chamber of Commerce has also appointed a reception committee and other committees to look after the interests of the delegates and visitors.

This city has a variety of public improvements that will well illustrate the subjects under consideration. It has about forty-five miles of asphalt pavement, including about twelve miles of German and Sicilian rock, seven miles of what is known as vulcanite pavement, and the remainder of Trinidad asphalt; mostly lake asphalt. It also has about ten miles of Medina block sandstone, some of it on very heavy traveled streets, eight to ten years old; also has about twenty-one miles of common Medina sandstone, several streets of block asphalt and from seven to eight miles of brick pavement, together with about twenty-four miles of macadam.

The Genesee river has a fall of about two hundred and sixty feet within the city limits, and is spanned by eleven bridges, some of them over two hundred feet in hight.

This city is generally conceded to be the best lighted city in the country, the main streets being especially well lighted by double enclosed arc lights. There are

altogether about 2,800 arc lights within the city limits.

The officers for this convention are: President, Edwin A. Fisher, Rochester, N. Y.; first vice-president, Charles H. Rust, Toronto, Canada; second vice-president, G. M. Ballard, Newark, N. J.; third vice-president, Charles C. Brown, Indianapolis, Ind.; secretary, George W. Tillson, Brooklyn, N. Y.; treasurer, F. J. O'Brien, Oswego, N. Y.

The following are the members of the local committees:

From the common council: H. H. Edgerton, president; Charles H. Judson, Frank A. Ward, James H. Casey, John McParlin, J. Miller Kelly.

From the executive department, city government: The Hon. A. J. Rodenbeck, J. Y. McClintock, William A. Sutherland, George A. Gilman, William N. Radenhurst, Samuel B. Williams, Charles F. Pond, James Johnston, William J. Stewart, John F. Skinner.

From the Chamber of Commerce and the business men of the city: The Hon. Henry C. Brewster, Daniel B. Murphy, Thomas B. Dunn, Louis N. Stein, Benjamin E. Chase, John M. Ives, A. B. Lamberton, H. B. Hathaway, A. J. Townson, L. P. Ross, William C. Barry, G. F. Roth, H. H. Rich, George W. Ham, Charles J. Brown, James D. Casey, Horace C. Brewster, Robert Cartwright, Max Brickner, E. M. Upton, George W. Archer, John A. Davis, V. F. Whitmore, F. C. Lauer, F. A. Brotsch, H. B. Hooker, LeGrand Brown.

CENTRAL STATES WATER WORKS ASSOCIATION

Proceedings — Electrolysis — Fire Streams — Flushing the Mains — Automatic Sprinklers — Stream Pollution — Water Purification — Sprinkling Wagons — Submerged Pipe.

The sixth annual convention of the Central States Water Works Association was held at Indianapolis Sept. 23, 24 and 25, with nearly one hundred in attendance.

The opening session on Tuesday afternoon preceded to business immediately after the mayor's address of welcome and the president's reply, and papers were read by John Langan, superintendent of water works at Tipton, Ind.; C. E. Inman, superintendent of the Warren Water and Light Company, Warren, O.; James R. Maxwell, C. E., of Cincinnati, O.; C. W. Wiles, superintendent of water works at Delaware, O.; S. A. Charles, superintendent of water works at Lexington, Ky., and F. A. W. Davis, vice-president and general manager of the Indianapolis Water Company, Indianapolis, Ind. These papers, or abstracts from them, are given below.

The evening was spent at the Commercial club rooms at a smoker under the management of the local committee and with the aid of club members.

On Wednesday morning the executive committee reported twenty new names for election to membership as follows:

Active: L. C. Anderson, Franklin, O.; George A. Weast, Springfield, O.; D. H. Maury, Peoria, Ill.; C. E. Inman, Supt. W. & L. Co., Warren, O.; S. A. Charles, Supt. and Engr., Lexington, Ky.; Paul Esselborn, trustee, Portsmouth, O.; L. M. Harris, trustee, Springfield, O.; James R. Maxwell, Hyde Park, Cincinnati, O.; O. G. Guyton, commissioner, Sistersville, W. Va.; Charles Carroll Brown, consulting engineer, editor of Municipal Engineering Magazine, Indianapolis, Ind.; T. B. Flago, trustee, Springfield, O.; Frank J. Kelly, Cincinnati, O.; R. R. Merriam, superintendent, Sandusky, O.; T. W. McNamee, superintendent, Wabash, Ind.; George Meister, secretary and superintendent, Mansfield, O.; Elkanah Hulley, superintendent, Marion, Ind.; John P. Force, hydraulic and sanitary engineer, Columbus, O.

Associate: Lamb & Ritchie, Cambridgeport, Mass.; American Valve and Meter company, Cincinnati, O.; Chicago Bridge and Iron company, Chicago, Ill.

The finance committee reported approval of the accounts of the secretary and treasurer, showing receipts of almost $500 and a balance of $40 in the treasury. Papers were then read by C. Monjeau, Marshall O. Leighton (read by the secretary), and A. L. Holmes. Two of these papers will be found below.

The afternoon and part of the evening were spent as the guests of the Indian-

apolis Water company in a trip about the Indianapolis Belt Railway to see the extent of the manufacturing establishments along its lines, in a visit and prolonged inspection of the elaborate plant

PRESIDENT JOSEPH J. PATER, HAMILTON, O.

and excellent machinery of the water company's pumping station and the site of its proposed filtration plant, and in a trip up the canal and through Fairview park, which was equal in value as a whole to a session of papers.

At the session of Thursday morning the following list of officers was elected, most of them being re-elections:

President, Joseph J. Pater, Hamilton, O.; vice-president, Frank J. Kelley, Cincinnati, O.; state vice-presidents, Frederick Baker, Evansville, Ind.; W. H. Glore, Covington, Ky.; T. H. Morton, Nashville, Tenn.; A. L. Holmes, Grand Rapids, Mich.; S. F. Tompkins, Joliet, Ill.; O. G. Guyton, Sistersville, W. Va.; secretary, William Allen Veach, Newark, O.; treasurer, Charles E. Rowe, Dayton, O.; executive committee, C. W. Wiles, Delaware, O.; George F. Cooper, Xenia, O.; Jere O'Shaughnessy, Columbus, O.; finance committee, T. R. Cook, Toledo, O.; John Langan, Tipton, Ind.; A. W. Inman, Massillon, O.

Dayton, O. was selected as the next place of meeting.

The following persons registered at the convention, but it is known that a number of members present did not put their names upon the secretary's register.

W. A. Clark, Wyoming, O.; Charles J. Thuman, Evansville, Ind.; A. J. Pray, Columbus, O.; William E. Sherwood, Evansville, Ind.; Henry Keller, Toledo, O.; G. G. Luebbing, Cincinnati, O.; E. E. R. Tratman, Chicago, Ill.; Frank Kelley, Cincinnati, O.; E. T. Evans, Brooklyn, N. Y.; C. W. Wiles, Delaware, O.; John Oliphant, Cleveland, O.; Robert B. McGowan, Cincinnati, O.; A. H. McAlpine, Columbus, O.; W. A. Kuhlman, Toledo, O.; A. L. Holmes, Grand Rapids, Mich.; S. A. Charles, Lexington, Ky.; O. G. Guyton, Sistersville, W. Va.; F. B. Mueller, Decatur, Ill.; W. C. Nusser, Findlay, O.; W. B. Mitchell, Piqua, O.; A. P. Briggs, Cambridgeport, Mass.; H. J. Putnam, Detroit, Mich.; S. F. Tompkins, Joliet, Ill.; T. B. Flago, Springfield, O.; D. T. Fenner, Cincinnati, O.; George H. Carr, Joseph T. Blair, Cincinnati, O.; W. H. Glore, Covington, Ky.; George F. Cooper, Xenia, O.; A. W. Inman, Massillon, O.; W. S. Nack, Covington, Ky.; Jasper R. Maxwell, C. E. Cincinnati, O.; G. A. Weast, Springfield, O.; Paul Esselborn, Portsmouth, O.; T. W. McNamee, Wabash, Ind.; D. W. Sinks, Troy, O.; Douglas A. Brown, Cincinnati, O.; T. R. Cook, Toledo, O.; O. B. Mueller, Decatur, Ill.; E. C. Humphreys, Cincinnati, O.; Edward P. Koetter, Louisville, Ky.; P. H. Boynton, Elyria, O.; T. H. Morton, Nashville, Tenn.; Fred Bosch, Washington, Ind.; H. W. Collins, Detroit, Mich.; John Langan, Tipton, Ind.; T. C. Clif-

TREASURER CHARLES E. ROWE, HAMILTON, O.

ford, Pittsburg, Pa.; J. H. Davis, Pittsburg, Pa.; C. A. Lucas, Dayton, O.; Stephen Solar, Cincinnati, O.; Thomas Ford Cincinnati, O.; J. W. Strackbein, Newark, O.; C. A. Rittman, Sandusky, O.; Charles P. Fuchs, Sandusky, O.; R. R. Merriam, Sandusky, O.; C. J. Spear, Toledo, O.; C. E. Inman, Warren, O.; George Meister, Mansfield, O.; E. G. Heeger, Evansville, Ind.; Fred Butler, Evansville, Ind.; E. F. Mull, Zanesville, O.; W. C. Handshy, Zanesville, O.; William Allen Mack, Newark, O.; A. E. Jones, Charles Carroll Brown, Indianapolis, Ind.; Joseph J. Porter, Hamilton, O.; W. H. Stephens, Lima, O.; John Thompson, Lima, O.; R. Stone, Lima, O.; J. P. Force, Columbus, O.

A number of excellent exhibits were made at the convention by manufacturers and dealers.

The Pittsburg Meter Company exhibited various sizes of Keystone meters. A. G. Holmes, general manager, was in charge, assisted by A. J. Pray and J. H. Davis.

The Neptune Meter Company was represented by Messrs. C. S. Brown and C. J. Spear. They exhibited Trident meters.

The H. Mueller Manufacturing Company exhibited tapping machines, stop cocks and brass fittings. Fred and Oscar Mueller were in charge. One of the features of their exhibit was a non-fouling reseating check valve. The souvenir canes distributed by this company were much appreciated.

Lamb & Ritchie exhibited lead and tin-lined iron pipe. Their interests were looked after by Mr. A. P. Briggs.

A. H. McAlpine and George H. Carr were in charge of the Hersey Manufacturing Company's exhibit of disc water meters.

H. J. Putnam and E. T. Ivens looked after the interests of the Thompson Meter Company, who exhibited various sizes of Lambert meters.

A tapping machine that attracted much attention was shown by A. P. Smith & Co. Mr. J. W. Strackbein was in charge.

Henry R. Worthington and the National Meter Company also exhibited water meters.

The Chicago Bridge and Iron Company distributed a handsome booklet illustrating steel tanks and iron structural work.

Electrolysis.

Mr. L. C. Anderson closed the convention with an interesting talk upon the subject of electrolysis, treating the subject in an elementary way and answering many questions from the members interested in the subject. He defined electrolysis and applied his definition to the passage of electric current from pipe to soil, showing the electrical and chemical action upon the metal in the pipe or appurtenance. He showed that the action takes place only where the current leaves the pipe on its way to the power house or in shunting around a joint of higher resistance. He reported a measurement of the resistance of a six-inch pipe joint 40,000 times that of the pipe itself. He has found serious damage in every city with the single trolley system which he has examined.

He recommended that no franchise contain any agreement which anticipates the use of the pipe system as a part of the railway system, that is, the single trolley system. Provision for the protection of the water system should be made not by dictating the system to be used, but the results to be accomplished. The water works management should be no party to any joining of rails to pipes. No current onto, over or from the piping system is the only safe stand. There is no remedy but an insulated return conductor of sufficient size. The only successful systems at this time are the double trolley and the underground conduit. But these should not be required in definite terms, only the results which they obtain are to be specified. Examinations at intervals are advisable both as to differences in potential, actual effect on pipes and amount of current passing along them, as in some cases it has been impossible to obtain damages for destruction before the time of first examination and notice to the railway company of such damage and to discontinue its cause.

The papers presented at the convention, with one or two exceptions follow.

Fire Streams.

By F. A. W. Davis, Vice-President and Manager Indianapolis Water Company.

While pressure has much to do with the stream for fires, the judicious laying of hose also has greatly to do with their effectiveness. A new rubber hose laid straight, level and no wind, will, according to Mr. Leshur, who is authority, give the following results: (Using rubber hose, 1¼-inch ring nozzle.)

Pressure at hydrant or steamer of 100 pounds and 100 feet of hose will give pressure at nozzle of 76 pounds and discharge 260 gallons per minute. A horizontal jet will reach 167 feet and vertical jet 131 feet. To maintain this discharge, distance and hight:

200 feet hose will require at hydrant or steamer, pressure 125 lbs.

300 feet hose will require at hydrant or steamer, pressure 149 lbs.

400 feet hose will require at hydrant or steamer, pressure 173 lbs.

500 ft. hose will require at hydrant or steamer, pressure 197 lbs.

600 feet hose will require at hydrant or steamer, pressure 222 lbs.

700 ft. hose will require at hydrant or steamer, pressure 246 lbs to the square inch, being about 24 pounds additional pressure required for each 100 feet of hose.

If pressure at hydrant or steamer remains constant at 100 pounds, using 100 feet of hose, the nozzle pressure will be 76 pounds, discharge, 290 gallons per minute. Horizontal jet wil reach 167 feet, vertical 131 feet. Pressure remaining the same, using

Feet of Hose.	Nozzle Pres.—lbs.	Gal. Dis.	Hor. Jet.	Vert. Jet.
200	61	234	147	112
300	51	214	132	97
400	44	198	119	86
500	39	186	110	78
600	34	174	100	70
700	31	166	94	65

The tables show that with 100 pounds pressure at hydrant or steamer and 100 feet of hose the pressure at nozzle is 76, discharge 290 gallons per minute, 167 feet horizontal and 131 vertical. With 700 feet of hose, pressure at nozzle 31 pounds, discharge 166 gallons per minute, 94 feet horizontal and 65 feet vertical. The result is 45 pounds pressure less, 94 gallons per minute less, 73 feet horizontal less and 66 feet vertical less.

Nothing can demonstrate more clearly than these figures the importance of using the least possible length of hose. If the the hydrant is within a hundred feet of the fire and 300 feet of hose is used, there is a diminution of pressure, 25 pounds, and the quantity of water discharged diminished by 46 gallons per minute. In addition to this the distance the stream will reach is reduced by 35 feet and the height by 34 feet.

If double lines of 2½ inch hose are united 50 feet from the nozzle of a 25 H. P. steamer, using 1¼ inch smooth nozzle, the results will be as follows:

Distance in Feet from Steamer to Nozzle.	Water Pressure at Steamer.			Effective pressure at Nozzle.			Gals. discharged per minute.			Horizontal Discharge.		
	Single.	Double.	Gain.	Single.	Double.	Gain.	Single.	Double.	Gain.	Single.	Double.	Gain.
500	165	132	33	45	72	27	258	324	66	128	175	47
1,000	198	146	52	34	58	24	216	293	77	100	152	52

If larger nozzles are used the discharge will be greater and more effective. By the use of double and triple lines, nozzle 1¾ inch and even 2 inch can be used. It is volume in a stream that is effective. A 1¼ inch stream thrown into a hot fire increases the heat by the water turning into gas. Sometimes the water never reaches the fire because of the heat. Small streams are not effective because of the stripping. Streams begin to strip at 30 feet from the nozzle and a stream that is to be effective must be delivered in a stream and not in drops. It is a common idea that the greater the pressure at the nozzle the greater the distance the water will reach, but it is an error. The greater the pressure the greater the friction and greater resistance by the air, and the force given the water is overcome by the gravity of the water. This results in a limit to the distance, no matter how great the force is. If a house is all afire when the department reaches it, it is folly to expect the men to put it out. Firemen must be cool, brave and strong. They must understand how to open hydrants, lay out hose and use the streams to the best advantage, but it is expecting too much of them to put out a fire when the house is almost consumed. Yet they often hamper themselves by injudicious laying of hose and not opening a hydrant properly. When it takes from 18 to 20 turns to fully open a hydrant, the fireman is likely to make his seconds, minutes, and stop short of the required number of turns in his haste.

Fire engines have been increased in capacity. Some nozzles have been designed that are an improvement over the old nozzles. But the hose remains the same, and the laying of it is not equal to the old reel. By reason of the lightness of the hose wagon better speed is made, which is of importance. It has been a question in my mind if the plan of lapping the hose in the wagon is not detrimental for the reason that it must in time make creases in the hose, and we know that creases will increase the friction.

Some cities, in order to provide better fire protection, are laying high pressure mains and using specially constructed machinery. It has occurred to me that a simpler way would be to construct engines with a greater capacity and place them on a car to run on the street car rails, using motors to run the cars and to drive the pumps (the current to be taken from the street car wires). The pumps should be of capacity to throw not less than a 3-inch stream from the car under heavy pressure. It may be possible to build heavy engines and drive them by gasoline engines. Should the capacity of the pumps be increased it would be then for the water departments to provide the water by means of larger hydrants and the fire department to have

increased size of hose to lay from the hydrants to the engines either on the street car rail or to the pumps on gasoline wagon. At the present time the engines must be located at the hydrant or at a cistern, while, if the water could be obtained as I have indicated, the engines could be located in front of the burning building.

These suggestions may not be feasible, but this paper is written to call attention to the necessity of providing increased fire protection, for the insurance companies are constantly increasing rates. Automatic sprinklers have much merit in them, but they are expensive and are not altogether free from objections to water departments for several reasons.

The action of the underwriters in requiring large mains in buildings will preclude all systems which have 4-inch pipe for main lines from meeting their requirements.

Flushing the Mains.

By John Langan, Superintendent Water Works, Tipton, Ind.

The author detailed his experiences with flushing mains, showing the inefficiency of flushing through hydrants and the evil effect upon hydrants and the water itself, and described his construction of a blow-off or washout in connection with a line of new pipe as follows:

Instead of stopping on S. East-st. with a dead end I stopped with a 6-inch valve, and put in 150 feet of 8-inch sewer tile to the bluffs of Cicero creek. By opening this valve and closing certain valves in the central portion of the city, the current is changed to any desired line or street and the result is that I can accomplish more in the flushing of mains in a very short space of time than was accomplished during the whole season by trying to flush the mains through the fire hydrants.

This manner of flushing the mains proved so satisfactory that I made another extension of 1,000 feet, closing with valve and 120 feet of sewer tile into Buck creek, and by opening the valve, with high pressure the whole western portion of our mains can be thoroughly flushed and no fire hydrants used in the operation.

Automatic Sprinklers and the Proper Rating for Them.

By C. E. Inman, Superintendent Water Company, Warren, O.

This paper discussed the perplexities of water works superintendents regarding charges for automatic sprinkler systems.

The people who install sprinkler systems argue that water is never used except in case of fire, that less water is then used than if the sprinklers were not installed, that it is to the advantage of the water company to have the systems and it should not make any charge for them. The manufacturer wants the system without charge, as it uses no water and he pays a large amount every year for use of water in his factory. The insurance companies require a large pipe directly from the main to the sprinkler system, free from hindrances to the flow of water, and object to having meters placed on the pipe.

The author wrote to several superintendents in Ohio asking what were their charges for this service. One town had a rate of $8 per quarter for each 10,000 feet of floor space, but is considering the advisability of charging meter rates. The attention of this superintendent was called to the possible impairment of the regular fire service by the flow of water from the sprinkler heads in time of fire, but he depends upon ample pumps and standpipe and had no fears. One superintendent has but one system, for which he charges one-third the amount saved on insurance policies. Another charges $25 to $300 a year, according to his own judgment. Another charges meter rates, fearing surreptitious use of water. He thinks 15 cents a sprinkler head per annum a very reasonable rate for the service.

The paper made a plea for action by the association looking toward uniformity of practice, the factory-owners now receiving the benefit of large reductions in insurance rates, to about one-third unprotected risks, and the party furnishing the protection receiving nothing or being put to continual trouble by objections. He calls attention to the opportunity for surreptitious use of water and to the fact that such unlawful use is often made.

In the discussion the members recounted similar experiences to those given in the paper and there was quite as much diversity of practice.

Mr. F. A. W. Davis of Indianapolis made statements showing the gradation of rates by his company according to size of tap made from $25 to $100 or more a year and cited several cases where the payment of $50 to $100 per annum for automatic sprinkler service saved from $1,200 to $3,000 in insurance premiums. A resolution was passed expressing the unanimous opinion of the convention that there should be an equitable charge for the protection afforded by the attachment of the automatic sprinklers to water supply systems.

In the course of the discussion it developed that there is similar trouble with lines of pipe and hydrants on private lines

connected with the public system, and that the opportunity for waste or unauthorized use of water is even greater than with the sprinklers, and another resolution was passed extending the provisions of the resolution to all classes of fire protection where water is used from the systems only in case of fire.

Stream Pollution and Its Pecuniary Damage to Natural Water Resources.

By Marshall O. Leighton, Hydrographer, U. S. Geological Survey.

The pollution of our natural waters seems, at present, to be under well-nigh universal sufferance. Strange as it may seem the growth of cities and the development of social, industrial and commercial progress has been attended by a costly and wanton abuse, which, even in these days of sharp competition and economical vigilance, has not received the attention of intelligent men. In sanitary associations and other bodies in which the consideration of hygiene is uppermost, there has been a more or less effective agitation of the subject, and there are, here and there, isolated cases in which these efforts have been attended by good results.

The basis of contention in sanitary associations is always the harmful effects which river pollution has upon the life and health of mankind; water supplies contaminated with sewage become dangerous to the individuals drinking the water; foul odors arising from a grossly polluted pond have certain deleterious effects upon the persons living in the vicinity. This humanitarian aspect of the case is, of course, the noblest of all, and, under millenial conditions would receive the quickest and most effectual response. A glance about this country does not in any sense show that there has been a great or spontaneous response to such appeals. I would therefore direct your attention to another phase of the problem, which, if precedents in other lines of the world's history serve as a basis for prophecy, will meet a more attentive audience than that which has come to the call of the hygiene agitator. The basis upon which my contention rests is money.

Water is a source of wealth. Throughout the world's history the location of water has determined the courses of migration, established the prosperity of colonies, located the sites of great cities and enriched the agricultural, manufacturing and commercial worlds. Let us consider for a short period the resource vested in natural waters: Stored in lakes and reservoirs or pumped from rivers or wells, water has become indispensable in our modern urban civilization. In early times, when every holder owned his own supply, this was not so apparent, but in our modern cities, with masses of people packed, tier on tier, the value of a conserved water supply cannot be questioned.

From prehistoric times water has been used as a means of transportation. When conserved in ponds or reservoirs and conducted by well-known means upon properly constructed wheels water has great value as a generator of power. Water is indispensable in most manufacturing processes, either as a factor in the process of manufacture or as one of the ingredients which enter into the manufactured product. Upon ponds and deep, slow-flowing rivers vast harvests of ice are raised, the value of which increase as the consumption of ice grows more and more common. Water finds extensive use in the arid or semi-arid regions of the United States as an irrigation agent and the application thereof to the non-productive lands in the West has already increased the value of those lands many fold. The lakes and streams of the sparsely settled country abound with fish which are of value as a food product. Finally water is a source of value to the land through which it courses or in which it is conserved. Ponds, lakes and rivers form a natural nucleus for beautiful residential places, parks and places of rest and recreation.

Water is applicable to the uses above enumerated only when it is in its normal condition; that is, when it is not polluted by the refuse from communities and industrial plants. When, however, the normal character of water is changed, it becomes no longer applicable for use in all the various branches, and the values depreciate more and more as the amount of contaminating matter increases therein.

The first resource to become damaged is that of municipal supply. American cities have learned by dear experience that it is unsafe to provide citizens with polluted drinking water. The cost of epidemics must be considered aside from the purely humanitarian aspect of the case; each life sacrificed through the administration of polluted drinking water is worth so much money, the amount varying according to the age and productiveness of the individual; each day of illness occasioned by said water means the suspension of so much labor and the loss of so much of the world's available capital. The suspension of a man's productiveness without good and sufficient reasons cannot be justified, and in addition to this, expenses occasioned by illness, such as physicians' fees, care and medicine are all expenses which cannot be charged to the incidental account of society.

The value of water as a means of development of power is not injured by pollution so long as the material is not supplied to the water in so large quantities that the latter ceases to be a fluid. But there have been cases where mill dams have held back and concentrated so much filth that the damage to surrounding property has been more than the value of the power site.

Many manufacturing processes require the use of fairly pure water and one of the first values in a stream to be affected is the employment of water in such processes.

Recent research has shown that the germs of typhoid fever inclosed in ice do not remain intact as long as has been believed. In fact, the life of the typhoid germ when frozen is probably not extended during long periods; therefore, the danger from polluted ice is not immediate, and its disease-producing ability is confined to the devitalizing effects of filth which render the human organism more susceptible to attacks of a specific character. Aside from the specific disease considerations, the idea of the use of polluted ice upon our food and in our markets is abhorrent and will not long be tolerated by an enlightened public.

Sewage polluted water is probably better for irrigation purposes than the normal water from a drainage area, although the manurial value of sewage is not as great as popularly supposed.

One of the commonest indications of sewage pollution in a stream is the disappearance of fish. Many excellent fishing grounds which have been a source of no inconsiderable income to numerous persons have been destroyed through the agency of sewage and industrial pollution.

Residential and park areas if favored with the presence of lakes or streams must have the water therein at least comparatively pure, and when such conditions do not obtain, the value of property in the vicinity decreases markedly. In fact, realty values seem to be more sensitive when affected by the presence of foul water than by almost any other agent.

A stream seldom, almost never, possesses all the values above enumerated. If it is navigable to any extent there can be no development of power nor can the stream be used with safety in its raw state as a source of water supply. On the other hand, if the water be conserved in reservoirs for the supply of cities and the course of the stream be interrupted at frequent intervals by power dams, there can be no development of transportation. Streams in the tropical or semi-tropical parts of the world have no value as ice fields and rivers running in humid lands do not possess value as sources of water for irrigation. Therefore, a stream which is useful as a source of power and water supply and is the home of fish loses much of its value when it becomes polluted with city and industrial wastes. Thus it is that under certain circumstances the entire value of a river is lost.

It may be helpful to review briefly the damage done to a river in the eastern part of the United States: Along the Passaic river in New Jersey, from Paterson to the mouth, a distance of about twenty miles, there has arisen one of the most costly conditions of pollution in the United States. A few years ago, before the grip of pollution had so closely fastened itself upon the river, the water supplies of three large cities and many small ones were pumped from the channel. An ice crop was taken out of the river weighing in favorable seasons 12,000 tons. Shad were abundant and famous and many persons derived no inconsiderable income from the sale of these fish. Land in that vicinity was worth from $500 to $800 per acre for farming purposes and when divided into building lots brought a much higher price. At the present time, with a volume of sewage discharging into the river greater than the minimum flow of the stream, the following conditions have been brought about:

1. Three water supply intakes have been abandoned and the supplies substituted for them will cost when developed to their full extent nearly $20,000,000.

2. The shad fisheries have been entirely destroyed and only one hardy, inedible fish will live in the stream.

3. The water can no longer be used to any extent in manufacturing and it is very destructive to boilers.

4. There is little, if any, market for the land immediately along the banks of the river, because the country is practically uninhabitable.

because of the odors which arise from the accumulation of sewage. One piece of land, about fourteen acres in extent, is an especially favored location for which $20,000 was refused fifteen years ago, is now upon the market for sale at any price, the owner becoming disgusted with the conditions, without hope of ever seeing them improved. Many localities in northern New Jersey which do not in any wise equal that in the vicinity of the Passaic river, have during the past few years increased in value enormously and judging from the development of suburban property about the city of New York, if this region could be relieved of the conditions which damage it so severely, there would be an unprecedented increase in values. Even now this condition could be almost entirely relieved by the expenditure of $6,000,000.

When conditions arise like those above described, they usually affect two or more states. Where rivers are long and state lines are closely set as they are east of the Mississippi river, there are many cases of interstate grievances which cannot be readily assuaged. A state or community made miserable by the flow of filth from a neighboring state into its borders is deplorably helpless. Because of this fact the national authority becomes interested.

The division of hydrography of the United States geological survey, has as its principal duty, the consideration of the water resources of the United States. During past years this consideration has been confined to the determination of the amount of water running through the streams and its favorable position for the development of power and service in processes of irrigation, etc. It has been seen, however, that the character bears so important an influence upon the water resources that it is necessary to carry along investigations of this nature coincident with the determination of quantity and position. The work along this line which

has recently been taken up is essentially in the nature of an investigation of actually existing conditions. The correction of evils disclosed does not lie within the province of the survey, and if after the information is collected there should be any official action taken by the United States congress the execution of restraining measures probably will be delegated to other authority. Our present duty, therefore, lies in the investigation of the enormous damages inflicted upon one of our finest natural resources, and for this purpose we need facts only.

It will be my endeavor as the official in charge of this new branch of the survey work to establish a system of co-operation with every chemical laboratory in the United States, wherever the analysis of water is conducted. It is desired to bring together the results of water examinations for study and comparison, such examinations to be made according to standard method, so that there may be uniformity of data. Coincident with this work the areas of special interest throughout the country will be taken up and studied. This has already been accomplished in the metropolitan district around New York. Similar work is now being carried on in the anthracite coal regions of Pennsylvania, and during the coming winter the drainage area of the Wabash river will receive attention. In the performance of this work I shall be glad to take council of the members of this association and shall be grateful for any and all assistance.

For further information concerning the scope and character of the work above described circulars 8 and 9 of the Division of Hydrography will be available upon application to the director of the United States Geological Survey. Water Supply paper No. 72, dealing with the pollution in the metropolitan area will soon be ready for distribution and this will soon be followed by another which contains a review of the work done in different parts of the country in the examination of river waters.

Eighteen Years' Experience in the Purification of Water.

By S. A. Charles, Superintendent Water Works, Lexington, Ky.

By the word "Purification" I mean not merely filtration, but also aeration and flushing of mains, etc.

My experience has been at Lexington, Ky., in a warm climate and where the ordinary modes of purification will not answer. Let me give a history. Our first reservoirs comprised about 120 acres of water, with a capacity of 360,000,000 gallons, but it was all impounded water, collected by building a dam across the valley and collecting the rainfall, but in our warm climate I found that while we had the water we also had the odor connected with it which arose from the decomposition of algae and other vegetable matter. My first attempt to remove the algae was by means of boxes of sponge, through which the water was passed, giving it a kind of a coarse straining or filtering. This, of course, was better than nothing, but I cannot say it was very much better. About that time mechanical filters were beginning to be used and the question in my mind was whether they could be made available. There was a long discussion at each Water Works convention about the respective merits of the filter bed system and the mechanical filter system. The filter bed system was out of the question with us. We did not have the land or the money to build them with, neither was the sand necessary for the use of them available. The question, therefore, was practically which of the mechanical filters was the best for our use. The pressure filter advocates and the gravity filter advocates were each anxious to sell us, but we finally decided on the gravity filter system and have seen no reason yet to regret our choice.

I think that much of the efficiency of the mechanical filter system depends on the proper admixture of the coagulant. In most of the systems that I have seen it is largely a matter of guess work and chance, and is left to the judgment of the filter man. We have a little simple device with us by which we are enabled with the utmost accuracy to inject either one grain or a millionth of a grain of coagulant per gallon. It is done in a very simple manner by having an auxiliary pump (without going into details), which is driven by the main pump and goes faster or slower as the main pump does. Its relative capacity to the main pump may be one thousandth of the main pump, and it is very easy to see that if this auxiliary pump injects clear water no coagulant at all is injected, but it may also inject a solution of any desired strength whether it be one grain or fifty per gallon.

But filtration and the proper coagulant and the strength of the coagulant are not the only necessaries with us at least. While these may filter out all solids, there yet remains with us, and probably in most southern climates, an odor, due to the decomposition of algae and vegetable matter. This odor being due to a gas and being much more volatile than the water itself, cannot be filtered out. The only way to remove it is to aerate the water and expose it to streams of air. We accomplish this by delivering the water to the filters through a pipe or tube perforated with about 1,600 minute holes and through which tube it falls in a spray to the filter below. We have also tried the effect of an air tube underneath this spray, filled with minute holes and supplied by an air compressor, the intention being to blow sprays of air through the sprays of water, but we found the air compressor expensive to run in practice and of but little if any benefit, because the simple falling of the spray of water through the air to the filter gave all the desired result in a much cheaper way.

So far we have dealt only with filtration and aeration, but there still remains something to be done with us. We found that some few minute germs of algae

in process of time would escape our filter, find lodgement in the pipes and would there germinate and in turn decompose and give out unpleasant odors to the customers. I am aware that flushing is not a new process at all, but I doubt whether it has yet been done as thoroughly and on as systematic a plan as ours. It is evident that when flushing is only done through the hydrants and the opening in the hydrant is three feet above the main, that flushing will not be as thorough as if the opening or exit were directly from the main itself. We have therefore put in what we call washouts at the lowest points in our system, and, each night in the week we flush some portion of our line directly through these washouts, aiming to flush the entire system thoroughly at least once a week and oftener if necessary. To do this we have a man stationed at the washout and assistants in other parts of the city, who, under his directions by telephone, open or close the proper valves to direct the main current to any line whatever out to the final exit, thus thoroughly washing and scouring that line.

I think I have explained our system. I do not care to go into theory. With us it has been an accomplished fact and we believe we are now furnishing water under adverse circumstances at less cost than any other water works we know of.

Street Sprinkling Wagons.

By C. W. Wiles, Defiance, O.

The practice of using hydrant water for street sprinkling wagons has been adopted in nearly every city to a greater or less extent. In many cities this is done by contractors who furnish their own horses, taking water at fire hydrants or especially constructed stand-pipes.

The value of the water so taken is computed in various ways according to the established practice in each locality or as the contractor can bargain with the Water Company or Department. Often the street is measured and a charge made per lineal foot per month or by the season; some keep a record of the number of loads of water taken each day and charge accordingly; the latest and most approved method is by attaching a suitable meter to each wagon, using one with a capacity equal to the stream taken from the hydrant, and a proper charge per thousand gallons made for the water. This is no doubt the most satisfactory, and a meter for this work can be easily obtained and attached to the wagon.

By this method streets that require but little water can be sprinkled two or three times per day and those requiring more attention could be sprinkled as often as necessary, and the wagon made to cover more streets. The average driver of a sprinkler wagon puts too much water on the street, which, on a paved street, runs into the gutter, and on unpaved streets makes mud, to the annoyance and complaint of owners of good carriages and bicycles.

If a charge is made per lineal foot it is often difficult to arrive at a fair estimate of the water required, streets varying in width, some protected by trees, some simply dirty roads, others macadamized or paved with brick or asphalt. In the case of paved streets, if thoroughly cleaned by sweepers or white wings, the amount of dust is greatly reduced and less water required than on very dirty streets, where the least wind stirs up a cloud of dust.

The ordinary charge by contractors for street sprinkling varies from 1 cent to 2 cents per foot front per month, which is paid by the property-owners on the street, and if not paid can be assessed upon the property as taxes. A law has recently been enacted in Ohio which places the street sprinkling in the hands of the city authorities, and by the petition of 35 per cent. of the voters the city council can order such streets sprinkled as they think best, and the actual cost of such sprinkling is placed upon the general city tax duplicate. This is upon the theory that street sprinkling is of a general benefit to all the people, the same as street lighting, street cleaning, etc. In some cities that have adopted this method during the past season the city has purchased sprinkler wagons and employed drivers who owned their teams, paying the usual price per day for team work. This has proved very satisfactory and no doubt is the most economical method for the people, as only the actual cost of team work, wagons and water is made and the people get their streets sprinkled at actual first cost, which in some cases has been as low as one-half cent per foot front per month.

If the city owns the water works that department should have credit for the value of the water taken the same as if owned by a company. In some cities with well-paved streets fairly well cleaned each wagon can cover about four miles, but where streets are dirty or macadamized and not often cleaned it will often require two wagons for the same distance. The question of street sprinkling is one that involves the use of large quantities of water, and is of benefit and comfort to the people if they do not want to breath poisonous dust blown in every direction.

Submerged Pipe.

By A. L. Holmes, Grand Rapids, Mich.

Perhaps there is no more perplexing condition presenting itself to a water works manager or superintendent than a deep stream separating his town and which it is necessary to cross with his mains to supply his customers with water.

While on land he can carefully inspect and observe every detail of pipe laying and see that the specifications in regard to tamping and back filling are rigidly complied with, yet when he lays a line under water he must rely upon the honesty and sense of feeling of the diver. Encased in brass and rubber, weighted with a hundred or more pounds of lead, whose shoes weigh thirty pounds, living

in compressed air, and who at the best in clear water sees as in moonlight, and in turbid water or in streams with muddy bottoms is unable to tell whether there is lead in a joint or broken bolts in a flange except by the sense of feeling.

Many of the faults and the faulty work done by the diver, and much of the time consumed by him, could be excused if we tried to realize the difficulties under which he labors in trying to repair leaks and broken pipes at the bottom of streams single-handed, when, if he tried to do the same work on the ground above water, he would have a very hard problem to solve if encased in the same suit.

Under the name of submerged pipe properly comes the river crossings so common to all of our cities, and which in many cases has been a source of trouble.

In the larger cities along the navigable waters care must be taken that the pipe lines are beyond the reach of keels or propeller wheels and the pipe protected at the docks and landings.

Then we must provide for the deepening of the harbors in the future, for Uncle Sam is arranging for about twenty feet of water in all the principal lake ports, and pipes must go well out of the way of dredge dippers.

About the only safe way for laying pressure pipes across navigable streams is to place them in a trench well below the bottom of the river and in this trench pipe carefully laid will give no trouble.

If the bottom is soft there is little trouble in dredging a trench, and if rock it can be drilled and blasted from the surface and the loose rock cleaned out of the trench, the most of it from above, but it will pay to send a diver down to be sure of a clean channel before sinking the pipe.

In some localities with soft bottoms it has been a custom to lay the pipe on the mud with the upper ends disconnected, and then by a sand pump working along the line of pipe gradually work it down to place. It is obvious that where this can be done in sand or mud the pipe will keep in the bottom of the trench and save the handling of some material. Eternal vigilance is necessary in all this class of work.

At Michigan City, Ind., a 20-inch force main across the harbor was lowered from a depth of 16 feet 5 inches to a depth of 20 feet by the use of a sand pump and without any repairs whatever. This pipe was 160 feet long and was fitted with 5 ball joints, and together with 1,200 feet of other pipe on shore showed a leakage under 100 pounds of water pressure of only 168 gallons in 24 hours.

A 16-inch riveted pipe across the stream at Hammond, Ind., was lowered in this way and by the use of a water jet and was perfectly tight when down.

Of course I do not advocate this way of doing the work where it is practicable to get and to maintain a trench otherwise, but some streams are so swift and carry so much fine sand or silt that the trench would fill as fast as dug.

My preference for submerged pipe is cast iron hub and spigot with lead joints and every 36 or 48 feet a flexible joint that will allow of considerable movement.

The Ward joint is perhaps as well known in this country as any of the various forms and was for quite a number of years the only one. During the last twenty years a half dozen others have come on the market and the price has been largely reduced.

Originally in using the Ward joint, which is made in the end of twelve feet lengths of C. I. pipe, it was the custom to use the whole line of submerged pipe of this kind, but this was not necessary and incurred a needless expense.

Wrought pipe both severed or riveted is used to a large extent by private concerns, and there is a sufficient spring to a six-inch wrought pipe with severed joints to conform to a surface that is quite uneven.

A flanged C. I. pipe for this work will be expensive to lay and probably cause trouble from leaks.

With medium-sized pipe, say up to twelve inches, the work of jointing and getting in place can be done from above water.

In one case under the writer's charge a line of about two hundred feet long was sunk in twenty feet of water lowered from the sides of scows by ropes and showed no leaks at the time, neither has it in the eighteen years since placed.

Of course many, or the most of these lines, do leak unknown to the water works managers, and the best way to ascertain the amount of the leakage is by placing a valve at each side of a river crossing with a by-pass around it in which to place a meter. With the valves closed and a pressure on the meter the leak can be measured quickly.

To locate the leak I have found the use of an air pump the most efficient and the quickest. With the valves closed and the air under pressure introduced into the submerged pipe the air bubbles coming to the surface will locate the leaky joints very quickly.

In many streams in the interior and where not interfered with by boats, pipes are jointed on a frame of timbers sloping toward the stream, and as each length is added the pipe is launched into the water, the outer end supported by floats, and as the pipe goes out floats are added about every twenty-four feet until the whole line is put together and it is then gradually lowered by long screws or ropes to the bottom.

Twelve-inch cast iron pipe can be handled in this manner for about $1 per foot including the lead used for joints and it will cost about as much for the smaller sizes, and but little more for the sixteen-inch.

In some small streams and moderate depth of water I have used benches built of 2 by 6 and 4 by 4 inch timber set in the ground or bottom of the stream and putting the pipe together on these platforms easily lowered it to the bottom, and I have personal knowledge of many lines that have been put in, in this manner that have given no trouble.

The placing of coffer dams and laying of pipe in them where practicable offers

no objections to doing good work, but it is generally very expensive in operation, and the work at Ft. Wayne last year, where a 24-inch cast iron pipe was laid across the St. Mary's river, is a fair sample of how long it may take to get in a few hundred feet of pipe in this manner.

In laying 24, 30 and 36-inch pipe in deep water I have connected forty feet with lead joints in the usual manner, placing on each end of this section a half of a bolted ball joint and lowering this into the trench prepared for it, holding one end off the bottom with a piece of wood 8 by 8 inches placed under the hub as the pipe was lowered to place. The next section prepared in the same way is lowered to place and while in the slings and held just clear of the bottom the diver enters the ball into the bell and bolts it up and so the process is continued.

The pipe can all be put in shape to lower to the bottom in a harbor or where the work can be handled most economically, and it is often the case that 500 feet of large pipe is laid in this manner daily, which means that the work can be done cheaply and well. Bulkheads are placed over the ends of the pipes before they are placed in the water to exclude fish and rubbish while lowering and are removed by the diver and sent up for use again.

I would not advise an attempt to get pipe very closely in line. If it zig-zags a little it may keep tighter if it settles any. In river crossings a curve up stream is generally desirable, so that as the current washes out under it and it works down stream it will become tighter.

In suction pipes in lakes I advocate the submerged crib or intake and in most cases I believe wood for this purpose is cheaper and preferable. In the great lakes, where there is navigation, I should advocate placing the outer end of the intake in forty or preferably fifty feet of water. Ice drifts on to shore and piles up and sinks until it is thirty feet deep, and this must be watched and guarded against if possible. There is much less danger of obstruction to the water supply if a submerged crib is used than if it reaches above the surface. A crib of timber twenty-four feet square and eight feet high, with a timber bottom and pockets loaded with stone, if no piles are necessary, can be placed for about $1,200.

Just as efficient protection is furnished by an upturned elbow on the end of the pipe in which is inserted a tee of the same size, the ends of which are barred, leaving openings about 3 inches wide and around this drive 12 piles 10 feet in the bottom and cut them off 2 feet above the top of elbow, rip-rap about this to top of casting and it is as safe as if a lot more money was invested.

All intakes and suction pipes for large plants should terminate in a reservoir or pump well on shore, to which the water should flow, and while pipes should be so planned that the pumps can operate directly on the intake, yet it is better that the pump, well or reservoir have screens to shut out all foreign matter and that they be large enough to allow sedimentation to take place if there is anything in the water.

All intake pipes should have valves placed at the outer ends and near the well with provision for closing both and testing, under pressure through a meter, for leaks and with air to locate them.

Leaky suctions, whether on shore or under water, are the terror of the pump engineer and reduce the efficiency of his machinery and ruin his engines. A little care and persistency will find and stop the leaky pipes and save annoyance and coal bills.

All suction and intake pipes should, of course, be laid to a grade that air pockets may be avoided.

Where suctions are partly above the water line, as in driven well connections, and are very long, in many cases it has proven advantageous to install an air or vacuum pump to expel the air that comes in from many leaking joints.

Ordinary lead joints will move considerably with no leaks and with an occasional flexible joint to facilitate getting the pipe in place, submerged pipe can be cheaply laid.

I would always insist on an efficient and easy way to test every pipe of this kind in use, and I consider that all submerged pipe should be looked upon with suspicion.

I once removed an intake at Negaunee, Michigan, laid in the bed of a muddy lake, the outer end in 30 feet of water, which, when laid ten years before, had been broken into five pieces, and which had sucked in the disease-breeding filth about one hundred feet from shore and sent it through the town instead of getting the pure water through the 1,200 feet of pipe as intended.

The experience at Duluth a few years ago where the intake was discovered broken in several places, and where typhoid was rampant evidently from this cause, is another instance, and neither could have happened if provision had been made for the test I mention and it had been enforced as it should be.

A plant taking water from wells across a small pond from their pumping station sunk a line of spiral riveted pipe for a suction and could not lower the wells at all, but an outbreak of typhoid and an investigation and analysis of the water disclosed the fact that the water in town was identical with that in the filthy pond and entirely unlike the well water.

Upon taking up this pipe, a connection was not only found through a tee with a check valve a few feet from shore, but some lengths of the pipe had let go or unwound, and the reason for the sickness and deaths discovered.

"Out of sight out of mind," is apt to be the rule with submerged pipe, but if the water works managers will look after these under water force mains they will in many cases find where a lot of the water they pump goes to, and if they will test their suction pipes going out to good water they will find them sucking in the filth and dangerous poisons in the mud near the shore and will find the reason

for a good many disease germs found in water taken from the faucets when an analysis of the water at the intake shows nothing of the sort.

The people demand good water and we can only furnish it by care in our construction of the plants, by the location of them to secure the best supply, and then by the utmost care to see that they remain uncontaminated.

Many cases of well supply, ample for domestic service are supplemented by a dangerous supply to be used only in case of fire and to be flushed out of the mains afterward. How does any one know that the filthy water is removed? And how sure are we that a leaky valve or a leaky engineer is not all the time mixing our drinks?

Better have only pure water for all purposes and save the lives of our people, and this protection they ask from the manager of water works.

NEW ENGLAND WATER WORKS ASSOCIATION

Proceedings—Cast-Iron Pipe Specifications—Private Fire Service.

The twenty-first annual convention of the New England Water Works Association was held at Boston, Sept. 10 to 12. The convention was considered one of the best ever held. J. O. Hall of Quincy, Mass., delivered an address on the "Duties of the Municipalities Regarding Water Supply. He said he believes the water works is one of the few public utilities which should be under municipal ownership. He did not favor restricting the use of water, except that he would discourage its use for driving water motors. Manufacturing services should be metered and fire hydrants should be under the charge of the fire departments. He did not favor putting all the costs of the public service on the various municipal departments, and he did favor making the charge for domestic service light. This paper brought out considerable discussion and attention was called to the frequent confusion of use and waste of water; the desirability of separating the cost of public and private service and putting the burden of each on the respective parties benefited; the possibility of accomplishing something worth while in the way of uniform statistics. As a fair rough-and-ready method of apportioning the cost of fire service Mr. Freeman C. Coffin, M. Am. Soc. C. E., suggested that it be made one-half the total cost of maintenance. He was of the opinion that the tendency to charge merely nominal rates for water used to drive motors is wrong.

The "Recent Construction on the Metropolitan Water Works" was described and illustrated by lantern slides by F. P. Stearns, M. Am. Soc. C. E., chief engineer of the metropolitan water and sewerage board. He said that when the work of placing the big blocks of masonry composing the stone was started each stone was bedded in mortar, lifted and then rebedded. After some experience the inspectors became able to tell, without lifting every block, whether rebedding was necessary. He believed that good bedding was secured, notwithstanding the claims that such is impossible. The big flume used for a number of years to convey the freshet flow of the river, has been cut away to make room for the dam. In heavy floods the water will flow over a gap in the dam. Mr. Stearns said that the general, if not the universal, practice has been to mix the concrete for aqueduct work by hand. Stone crushing and concrete mixing plants have been provided, however, for every 4,000 ft. of the Weston aqueduct.

The "Water Supply of Nashua, N. H." was the subject of H. G. Holden's paper, who is superintendent of the Nashua works. He described the evolution of a water supply through a long period of years. Surface water was used until recently, when a fine supply of spring artesian water, very near the surface, was developed in a location from which it flows by gravity to the pumping station. Water power was used for pumping for years, then water and steam power and finally water power again.

"The Removal of Color and Odor from Water" was talked over by H. W. Clark, chemist of the Massacnusetts state board of health in which he reviewed some of the experiments along this line made at Lawrence and elsewhere.

Two slow sand filters in use for a number of years at the Lawrence experiment

station, operating at rates of 2,500,000 and 3,000,000 gallons, respectively, removed an average of about 33 per cent. of color. In general, less color was removed when the rainfall was highest, the percentage sometimes falling to 20, while in other years the amount removed was 50 and sometimes 60 per cent. The foregoing experiments were made with water from the Merrimac river. Beginning with 1899, decaying vegetable matter was added to Merrimac water placed in a tank, and the decoction was applied to a number of slow sand filters. With filtration at rates of 2,000,000 to 5,000,000 gallons per acre per day from 60 to 80 per cent. of the color was removed. Old organic matter, giving rise to more bacterial action than less easily fermented material, showed a higher degree of color reduction. It was found that by using alum or ferric chloride practically all the color could be removed.

For some thirteen months, ending with January, 1902, studies were made of the effect of single and double filtration on the frequently troublesome water from the Ludlow reservoir, Springfield, Mass. Single filtration at rates of 2,500,000 and 5,000,000 gallons, removed about 63 per cent. of color, and a second filtration of the same water, but at a rate of 10,000,000 gallons, brought the total removal up to 75 per cent. These figures were for the "worst" five months, but earlier and later single filtration gave results ranging from 17 to 40 per cent. At another place, sand filtration has removed nearly all the color.

Odors are easily removed from the Merrimac river with sand filters working at a high rate of speed. The Ludlow reservoir water was practically freed from odor by single filtration at rates of 2,500,000 and 5,000,000 gallons, until July, when anabena gave a decided odor to the effluent. Double filtration removed all the odor. There was no discussion on this paper.

In talking on "The Physical Properties of Water," Allen M. Hazen, M. Am. Soc. C. E., described the new pocket apparatus for determining color and turbidity, devised by George C. Whipple, Assoc. M. Am. Soc. C. E., and himself, for the use of observers in behalf of the United States geological survey. He urged the importance of securing turbidity and color records throughout the country.

The report of the committee on "Uniform Statistics" recommended the consolidation of the two financial schedules heretofore used in the standard form of water works reports. The recommendations and a few minor changes in the schedule were approved. The report of the committee on standard specifications for cast iron pipe was accepted and adopted. Selections from this report are given below. The committee is composed of Freeman C. Coffin, M. Am. Soc. C. E., 53 State-st., Boston, Mass.; F. F. Forbes, superintendent of water works, Brookline, Mass.; Dexter Brackett, M. Am. Soc. C. E., engineer distribution department, Metropolitan water works, 1 Ashburton-place, Boston.

A committee was appointed to report nominations of officers to be elected at the annual meeting in January, 1903. The committee is composed of Desmond Fitzgerald of Boston, F. H. Crandall of Burlington, Vt.; Byron I. Cook of Woonsocket, R. I.; Joseph Beals of Middleboro, Mass.; C. C. Hastings of Concord, Mass.

Standard Specifications for Cast Iron Pipes.

The final report of the committee on standard specifications for cast iron pipe states that it had two conferences of two sessions each with a sub-committee representing the pipe foundries, including Walter Wood, L. R. Lemoine, A. H. McNeal and Overbolt Long. The committee says that while each side "naturally looked at the subject from its own point of view," yet it believes that "the net result was an endeavor to eliminate such requirements as would result in excessive cost of manufacture without a corresponding increase in quality of the pipe or facility in its use, and to retain all requirements tending to secure actual benefits to the users of pipe."

The committee agreed, wholly or in part, to some of the changes desired by the manufacturers, but did not entirely agree on all points. The chief point at issue was a uniform outside diameter for all pipes of the same nominal size. This plan, the committee thought, would make such material savings in the patterns for the outsides of the pipe as to render the change acceptable to the manufacturers. It found, however, that any such was more than offset by the vastly increased number of fittings which would be required for the casting of the inside of the socket of the pipe where the inside diameter varies with each class. There was, besides, a danger that the pipes would be of poor quality if too great difference in the thickness of the pipe were made by increasing the thickness of the clay core. "The design of the pipe was finally modified so as to retain the advantages of a single class of castings for all of the classes of the smaller size of pipe, and the possibility of using the pipe interchangeably." The specifications submitted to the association, and adopted, were as follows:

Sec. 1. Description of Pipes—The pipes

shall be made with hub and spigot joints, and shall accurately conform to the dimensions given in tables Nos. 1 and 2. They shall be straight, and shall be true circles in section, with their inner and outer surfaces concentric, and shall be of the specified dimensions in outside diameter. They shall be at least 12 ft. in length, exclusive of socket. For pipes of each size from 4 to 16 ins. in diameter there shall be two standards, and for each larger size three standards of outside diameter. The inside diameter of each class shall be increased from the nominal size in the manner hereinafter specified, so as to obtain the standard thickness and weight. For pipes from 4 to 16 ins. in diameter one class of special castings shall be furnished with all classes of pipes. For pipes from 18 to 24 ins. in diameter, Class D special castings shall be furnished with pipes of Classes A, B, C and D, and Class F special castings with pipes of Classes E and F. For pipes 30 ins. in diameter and larger, Class B special castings shall be used with pipes of Classes A and B, Class D special castings with pipes of Classes C and D, and Class F special castings with pipes of Classes E and F. (Tables are omitted.)

All pipes having the same outside diameter shall have the same inside diameter at both ends. The inside diameter of the lighter pipes of each standard outside diameter shall be gradually increased for a distance of 6 ins. from each end of the pipe, so as to obtain the required standard thickness and weight for each size and class of pipe.

Sec. 2. Allowable Variation in Diameter of Pipes and Sockets—Especial care shall be taken to have the sockets of the required size. The sockets and spigots will be tested by circular gages, and no pipe will be received which is defective in joint-room from any cause. The diameters of the sockets and the outside diameters of the spigot ends of the pipes shall not vary from the standard dimensions by more than .06-in. for pipes 16 ins. or less in diameter; .08-in. for 18-in., 20-in. and 24-in. pipes; .10-in. for 30-in., 36-in. and 42-in. pipes; and .12-in. for 48-in., 54-in. and 60-in pipes.

Sec. 3. Variation in Thickness—For pipes whose standard thickness is less than 1 in., the thickness of metal in the body of the pipe shall not be more than .08-in. less than the standard thickness, and for pipes whose standard thickness is 1 in. or more, the variation shall not exceed .10-in., except that for spaces not exceeding 8 ins. in length in any direction, variations from the standard thickness of .02-in. in excess of the allowances above given shall be permitted.

Sec. 4. Defective Spigots May be Cut—Defective spigot ends on pipes 12 ins. or more in diameter may be cut off in a lathe, and a half-round wrought-iron band shrunk into a groove cut in the end of the pipe. Not more than 12 per cent. of the total number of accepted pipes of each size shall be cut and banded, and no pipe shall be banded which is less than 11 ft. in length, exclusive of the socket.

In case the length of a pipe differs from 12 ft. the standard weight of the pipe given in table No. 2 shall be modified in accordance therewith.

Sec. 5. Special Castings—All special castings shall be made in accordance with the cuts and the dimensions given in the tables forming a part of these specifications.

The diameters of the sockets and the external diameters of the spigot ends of the special castings shall not vary from the standard dimensions by more than .08-in. for castings 16 ins. or less in diameter; .10-in. for 18-in., 20-in. and 24-in. pipes; .13-in. for 30-in., 36-in. and 42-in. pipes; and .16-in. for 48-in., 54-in. and 60-in. pipes.

The flanges of all manhole castings and manhole covers shall be faced true and smooth and drilled to receive bolts of the sizes given in the tables. The contractor shall furnish and deliver all bolts for bolting on the manhole covers, the bolts to be of the sizes shown on plans, and made of the best quality of mild steel, with hexagonal heads and nuts and sound, well-fitting threads.

Sec. 6. Marking—Every pipe and special casting shall have distinctly cast upon it the initials of the maker's name. When cast especially to order, each pipe and special casting shall also have cast upon it figures showing the year in which it was cast and the number signifying the order in point of time in which it was cast, the figures denoting the year being above and the number below; thus:

1901	1901	1901
1	2	3

etc., also any initials, not exceeding four, which may be required by the purchaser. The letters and figures shall be cast on the outside and shall be not less than 2 ins. in length and ⅛-in. in relief for pipes 8 ins. in diameter and larger. For smaller sizes of pipes the letters may be 1 in. in length. The weight and the class letter shall be conspicuously painted in white on the inside of each pipe and special casting after the coating has become hard.

Sec. 7. Percentage to be Paid For—No pipe shall be accepted the weight of which shall be less than the standard weight by more than 5 per cent. for pipes 16 ins. or less in diameter, and 4 per cent. for pipes more than 16 ins. in diameter; and no excess above the standard weight of more than the given percentages for the several sizes shall be paid for. The total weight to be paid for shall not exceed for each size and class of pipe received the sum of the standard weights of the same number of pieces of the given size and class by more than 2 per cent.

No special casting shall be accepted the weight of which shall be less than the standard weight by more than 10 per cent. for pipes 12 ins. or less in diameter and 8 per cent. for larger sizes; and no excess above the standard weight of more than the above percentages for the several sizes will be paid for.

Sec. 8. Quality of Iron—All pipes and

special castings shall be made of cast iron of good quality, and of such character as shall make the metal of the castings strong, tough, and of even grain, and soft enough to satisfactorily admit of drilling and cutting. The metal shall be made without any admixture of cinder iron or other inferior metal, and shall be remelted in a cupola or air furnace.

Sec. 9. Tests of Material—Specimen bars of the metal used, each being 26 ins. long by 2 ins. wide and 1 in. thick, shall be made without charge as often as the engineer may direct, and in default of definite instructions the contractor shall make and test at least one bar from each heat or run of metal. The bars, when placed flatwise upon supports 24 ins. apart and loaded in the center, shall for pipes 12 ins. or less in diameter support a load of 1,900 lbs., and show a deflection of not less than .30-in. before breaking, and for pipes of sizes larger than 12 ins., shall support a load of 2,000 lbs. and show a deflection of not less than .32-in. The contractor shall have the right to make and break three bars from each heat or run of metal, and the test shall be based upon the average results of the three bars. Should the dimensions of the bars differ from those above given, a proper allowance therefor shall be made in the results of the test.

Sec. 10. Casting of Pipes—The straight pipe shall be cast in dry sand molds in a vertical position. Pipes 16 ins. or less in diameter shall be cast with the hub end up or down, as specified in the proposal. Pipes 18 ins. or more in diameter shall be cast with the hub end down.

The pipe shall not be stripped or taken from the pit while showing color of heat, but shall be left in the flasks for a sufficient length of time to prevent unequal contraction by subsequent exposure.

Sec. 11. Quality of Castings—The pipes and special castings shall be smooth, free from scales, lumps, blisters, sand holes, and defects of every nature which, in the opinion of the engineer, unfit them for the use for which they are intended. No plugging or filling will be allowed.

Sec. 12. Cleaning and Inspection—All pipes and special castings shall be thoroughly cleaned and subjected to a careful hammer inspection. No casting shall be coated unless entirely clean and free from rust, and approved in these respects by the engineer immediately before being dipped.

Sec. 13. Coating.—Every pipe and special casting shall be coated inside and out with coal-tar pitch varnish. The varnish shall be made from coal tar. To this material sufficient oil shall be added to make a smooth coating, tough and tenacious when cold, and not brittle, nor with any tendency to scale off.

Each casting shall be heated to a temperature of 300 degrees F. immediately before it is dipped, and shall possess not less than this temperature at the time it is put in the vat. The ovens in which the pipes are heated shall be so arranged that all portions of the pipe shall be heated to an even temperature. Each casting shall remain in the bath at least five minutes.

The varnish shall be heated to a temperature of 300 degrees F. (or less, if the engineer shall so order), and shall be maintained at this temperature during the time the casting is immersed.

Fresh pitch and oil shall be added when necessary to keep the mixture at the proper consistency, and the vat shall be emptied of its contents and refilled with fresh pitch when deemed necessary by the engineer. After being coated, the pipes shall be carefully drained of the surplus varnish. Any pipe or special casting that is to be recoated shall first be thoroughly scraped and cleaned.

Sec. 14. Hydrostatic Test.—When the coating has become hard, the straight pipes shall be subjected to a proof by hydrostatic pressure, and, if required by the engineer, they shall also be subjected to a hammer test under this pressure.

The pressure to which the different sizes and classes of pipes shall be subjected are as follows:

	Pounds per sq. in for —diameters of—: 20 ins. and larger.	Less than 20 ins.
Class A	150	300
Class B	200	300
Class C	250	300
Class D	300	300
Class E	350	350
Class F	350	350

Sec. 15. Weighing.—The pipes and special castings shall be weighed for payment under the supervision of the engineer, after the application of the coal-tar pitch varnish. If desired by the engineer the pipes and special castings shall be weighed after their delivery, and the weights so ascertained shall be used in the final settlement, provided such weighing is done by a legalized weighmaster. Bids shall be submitted and a final settlement made upon the basis of a ton of 2,000 pounds.

Sec. 16. Contractor to Furnish Men and Materials.—The contractor shall provide all tools, testing machines, materials and men necessary for the required testing, inspection and weighing at the foundry of the pipes and special castings; and, should the purchaser have no inspector at the works, the contractor shall, if required by the engineer, furnish a sworn statement that all of the tests have been made as specified, this statement to contain the results of the transverse tests upon the test bars.

Sec. 17. Power of the Engineer to Inspect.—The engineer shall be at liberty at all times to inspect the material at the foundry, and the molding, casting and coating of the pipes and special castings. The forms, sizes, uniformity and conditions of all pipes and other castings herein referred to shall be subject to his inspection and approval, and he may reject, without proving, any pipe or other casting which is not in conformity with the specifications or drawings furnished.

Sec. 18. Inspector to Report.—The inspector at the foundry shall report daily to the foundry office all pipes and special castings rejected, with the causes for rejection.

Sec. 19. Castings to be Delivered Sound and Perfect.—All the pipes and other castings must be delivered in all respects sound and conformable to these specifications. The inspection shall not relieve the contractor of any of his obligations in this respect, and any defective pipe or other casting which may have passed the engineer at the works or elsewhere shall be at all times liable to rejection when discovered, until the final completion and adjustment of the contract; provided, however, that the contractor shall not be held liable for pipes or special castings found to be cracked after they have been accepted at the agreed point of delivery. Care shall be taken in handling the pipes not to injure the coating, and no pipes or other material of any kind shall be placed in the pipes during transportation or at any time after they receive the coating.

Sec. 20. Definition of the Word "Engineer."—Wherever the word "engineer" is used herein it shall be understood to refer to the engineer or inspector acting for the purchaser, and to his properly authorized agents, limited by the particular duties intrusted to them.

Private Fire Protection Systems.

The reports of the committees of the New England and the American Water Works Associations on private fire protection were read at the convention. The New England Water Works Association appointed a committee some time ago to investigate "The Apportionment of Charges for Private Fire Protection and Means of Controlling the Supply Thereto." The committee consists of seven members, three of whom are water works superintendents, three connected with engineering or inspection departments of fire insurance companies and one a civil engineer, who has been a water works superintendent. The committee made three reports, representing the three sections named above. The report of the water works section of the committee which is composed of F. H. Crandall, Burlington, Vt.; Charles K. Walker, Manchester, N. H.; J. C. Hammond, jr., Rockville, Conn., superintendents of water works at the places named, is as follows:

That we find the opportunities for taking water without the knowledge of the water department afforded by the presence of private fire pipes are frequently taken advantage of.

That furnishing private fire protection merits compensation.

That the compensation, however, should not be such as to discourage the use of automatic sprinkler systems.

That securing assurance of the use of private fire pipes for such purposes only, is a matter of small expense, and may reasonably be required.

We would recommend, provided trustworthy evidence in regard to the service and reasonable remuneration, for the protection afforded be furnished, such applications for private fire services as will not unwarrantably jeopardize other interests, be granted.

The insurance section of the committee is composed of Byron I. Cook, Woonsocket, R. I.; Henry A. Fiske and Edward V. French, both of Boston, representing both the mutual factory and the stock insurance company interests. The report says:

Taking the country at large, water is taken somewhat frequently from private fire pipes for manufacturing and miscellaneous uses without the knowledge of the water department. The majority of such takings are not with deliberate intent to defraud the water department, but from a lax view of the rights in the case. Instances of intentional stealing, even to the extent of making concealed taps, are, however, not uncommon.

The committee cited the advantages which private fire protection affords to the public through lessening all the injuries to a community incident to the destruction of a manufacturing industry, and also by decreasing the liability to general conflagations. The private fire service should be regarded as but an extension of the general fire protection afforded the public, and therefore should be as free as the latter, "provided that absolute assurance is secured that the water is not used for any other purpose." The extent to which those directly benefited should pay for private fire protection is stated as follows:

Plants having private fire protection should pay all cost for such equipment, all the first cost for connecting to the public mains, and a yearly charge ample to reimburse the public water department for all reasonable supervision of their fire pipes, such as to read and keep in repair any detecting devices which may be provided, and any other similar expenses.

Regarding the various means of making sure that private fire services are used for no other purpose, the report said that ordinary meters are unsatisfactory "from the possibility in many types of serious obstruction to the flow" and because the "large size meters are not sufficiently sensitive to detect the smaller drafts."

Seals, to be broken when necessary, and to result in a penalty when their breaking cannot be satisfactorily explained, give "considerable protection, but are not positive safeguards, and require constant supervision." The general extension of seals would not be favorably regarded by the fire underwriters, because it would tend to lessen the efficiency of the private fire brigades.

Meters on five-eighths inch by-passes

can be quickly applied without warning, and their further use seems to have possibilities worthy of consideration.

The appointment of a committee was reported, in conclusion, to report on "means whereby assurance may be had that private fire pipes are used for fire purposes only;" also, that the new committee confer with the American Water Works Association and the National Fire Protection Association.

A brief report was submitted by John C. Chase, M. Am. Soc. C. E. of Derry, N. H., who said that water is doubtless taken without being paid for, but such action is due to the low moral standards regarding public water supplies rather than to premeditated larceny. He thought that the water consumer should bear all the expense of construction and also of devices to detect the wrongful use of water. Unlawful users of water should be deprived of water altogether.

A committee report on the same general subject submitted to the American Water Works Association last June was read by F. H. Crandall. The members of the committee are George H. Felix, president water board, Reading, Pa.; C. E. Bolling, superintendent, Richmond, Va.; C. H. Campbell, superintendent, Charlotte, N. C. The report is as follows:

Your special committee appointed to consider and report upon the question of the control and regulation of private fire service begs leave to report and recommend:

That it be the sense of this association that the following regulations should be enforced:

1. That all applications for attachments to street mains for private fire service, be accompanied by a draft or plan of the proposed pipe system intended to be used on the property to be protected, together with a concise statement as to what other purpose the system might be used for.

2. That upon approval of the application by the proper authority, its construction shall be such as to insure an accounting of all water used. Meters for this purpose to be installed and used.

3. That by reason of the additional protection received by the property-owner and because of the risk entailed upon other portions of the supply lines in case of a fire, it is eminently fair and just that there be made an equitable charge for every private fire service.

4. That the objection of fire insurance companies to the use of water meters on private fire service attachments is not well founded and should be opposed by the managers of water works systems.

5. That all expenses incident to the installation of private fire service attachments, including cost of meters, be borne by the applicant or owner of the property.

6. That the size of the openings for attachments shall be such as the engineer or superintendent shall find adequate, keeping in view, when deciding the question, the requirements necessary to properly protect other property on the same supply lines.

That to avoid surreptitious use of the water, devices be adopted by the superintendent and engineer to detect same, and in this connection we call attention to that of Mr. Alexander of Wilkinsburg, Pa., as an example, and of which we will present a plan to the association.

The three reports were finally accepted.

HIGHWAYS

The Asphalt Situation—Brick and Stone—New York to Chicago—Notes.

The Asphalt Trust Reorganization Imminent.

(Special to Municipal Engineering Magazine.)

PHILADELPHIA, Sept. 24.—There is now scarcely a doubt that the reorganization plan of the bondholders' committees of the Asphalt Company of America and the National Asphalt Company will be declared operative within a few days. Members of the committee assure the public that over 90 per cent. of the bondholders have given their assents to the plan, or will do so by the time it is ready to put in operation.

Early in the month assents were coming in rather tardily and by Sept. 15, the last day for such assents, there was no positive assurance that a sufficient number would be procured to make the plan operative. Since then, however, they have continued to take acceptances, and while no list of those assenting to the plan has been given out, it has been learned that nearly all of the dissatisfied holders of American fives, who had first intended to join William C. Bullitt of Philadelphia in his suits against the promoters of the trust, have decided to take their chances under the proposed reorganization plan. The small bondholders are practically all

in favor of the new plan, they having come in early, fearing a threatened failure thereof might result is complete disintegration and a nearly total loss on their securities.

It is claimed that the objections of William C. Bullitt to the plan are of a personal character, a friend of his having lost nearly all his fortune in the asphalt collapse. On hearing of this Mr. Bullitt declared he would make the parties suffer who were responsible and has consequently done everything to expose them.

During the month the receivers of the asphalt trust have been active in planning for a more economic operation of the business and Henry C. Tatnall, one of the receivers, stated that they had disposed of the services of a large number of officers and employes, saving $130,000 a year on expenses. Mr. Tatnall stated the business this year would slightly exceed that done last year, the development in the sales of asphalt for uses other than paving having increased the business. The prices for the year have been very low, owing to sharp competition. The losses on the National Contracting Company for the current year, Mr. Tatnall did not think would reach $100,000, although they showed a deficit of twice that sum last year. He also believed there would be a considerable increase from the suits pending or to be begun. Receiver Mack has just completed a tour of the West, where he was engaged in reorganizing and concentrating the subsidiary companies.

It is not likely that William C. Bullitt will appeal from Judge Kirkpatrick's adverse decision to his petition to the United States circuit court of New Jersey, which decision was referred to in the August number of this magazine. Instead of appealing Mr. Bullitt has sent out a letter to two hundred certificate holders of the Asphalt Company of America, who have communicated with him in regard to the litigation. He asks them not to assent to the reorganization, but to form an organization whereby the rights of non-assenting bondholders will have to be paid in cash, they still retaining the right to sue the promoters and receivers.

Attorney J. W. M. Newlin of Philadelphia has filed his exceptions in the Philadelphia common pleas courts to the answer of the defendants in the suit of his client, Hannah V. Gallagher, to recover $21,000 in gold certificates from the Biddle committee.

A new feature in the asphalt situation in Philadelphia, though not affecting or directly applying to the trust, was the suit brought by Richard B. Morrell, in common pleas court No. 3, on Sept. 22 against George D. Widener to recover $25,000 damages for losses sustained owing to alleged misrepresentations by the defendant concerning the value of asphalt stock. In his statement Mr. Morrell asserts that he was the owner of bonds and preferred stock of the two companies, and that when the market value of these securities was falling in the summer of 1901, he wrote to P. A. B. Widener, father of George D. Widener, asking him for information and advice as to retaining the stocks and bonds in question. He says he received a letter from George D. Widener, a director in the two asphalt companies, stating that they were doing a prosperous and large business, and that they attributed the depreciation in asphalt values to the unsettled condition of Venezuelan affairs. Relying upon this statement Mr. Morrell retained his holdings and bought additional shares of preferred stock and bonds. As the result he claims to have sustained $25,000 damages. Mr. Morrell also asserts that Mr. Widener disposed of large quantities of his own holdings at fictitious prices largely created by himself, although he knew the companies were being run at a great loss. He involves John M. Mack and George W. Elkins of Philadelphia in the representations of the prosperous condition of the asphalt companies.

W. B. B.

A Combination Pavement.

A new pavement laid by a traction company in Perth Amboy, N. J., has aroused some interest because of the manner in which it is laid. The old pavement consisted of a strip of macadam pavement between the car tracks, with the vitrified brick pavement on either side. The new pavement consists of alternate rows of Belgian blocks and vitrified bricks. It is believed that this arrangement will be of some benefit in protecting the bricks, as the harder Belgian blocks will prevent the bricks from chipping off at the edges. The difference in rate of wear on account of the difference in hardness of the two materials does not seem to have been considered. It is probable that the bricks will wear and then crush out under the blows of wheels falling on them from the higher stone blocks, making the pavement much rougher than one of either material used alone. A report after a year of wear will be of interest.

A Highway Between New York and Chicago Proposed.

The recent organization of the New York and Chicago Road Association is arousing considerable interest in the subject of good roads. The object of the as-

sociation is to build a road between these two cities that will act as an object lesson to convince the people of the necessity of good roads and the losses that accrue from bad roads. The road will pass through a number of important cities, including South Bend, Toledo, Cleveland, Jamestown, Binghamton, Kingston, Newburgh and many others.

During September William L. Dickinson and L. C. Boardman, representatives of the association, went over the entire route in a steam automobile. Careful attention was paid to the condition of the roadway and each town along the proposed road was visited in order to arouse enthusiasm toward the project. Data have been compiled showing the condition of almost every mile of road between New York and Chicago.

The association has several ways in view by which the work of improving the road may be accomplished expeditiously; by town and county bonding the roads in periods long enough to enable them to pay off principal and interest in a certain number of years; another, by state aid, and yet another is the entire cost to be paid by the government. Argument in favor of the latter is this:

Vast sums of money are expended by the government annually in various public improvements and in support of numerous measures, and very wisely the advocates of this plan argue that, if expenditures can be made for such objects, the vital, important one of good roads deserves a modicum of consideration and aid. There is a precedent for this, too, in the way the government devoted, as far back as 1826, $14,000,000 for a national turnpike from Washington, D. C., toward the West. Remnants of this road still are in evidence in some parts of Maryland, Ohio, Indiana and Kentucky.

The Buffalo Times, in commenting on the proposed road, says:

It is a fact that since the establishment of steam and electric railroads the construction of turnpikes, or boulevards, has suffered much, except roads built for comparatively short distances. This, of course, has been a natural result, as traveling by private carriage, drawn by horses, has long since given way to the swifter steam motor railroad traveling, and the railroads have literally become the highways of the nation.

But within the last few years there has been a most commendable revival of interest in good roads, and as a factor toward this end the humble bicycle played no unworthy part. The introduction of the automobile promises to result in the construction of magnificent thoroughfares of great extent. One who travels through a country on a railroad train learns nothing of the district through which he is whirled at express speed. There is no real pleasure in such traveling; in fact, it is not traveling in the real sense of the term; it is simply being hurled from one point to another with the greatest possible haste.

If the introduction of automobiles shall result in the construction of such thoroughfares as the one suggested from New York to Chicago, these later inventions will have served a splendid purpose outside of affording a pleasure to the wealthy class, for such highways may be used by each and all. The automobile will never drive the noble horse from the affectionate regard of man, and the building of such roadways would, I believe, bring back into fashion the good old times of yore. Just imagine a national turnpike from Boston and New York clear to San Francisco! It could be so constructed that one portion of it should be used solely for automobiles, and the other section for horse-drawn vehicles. Such, I understand, is the intent with regard to the NewYork-Chicago boulevard.

Profitable Highway Inspection.

A couple of young men up in New York state have been following a very profitable little profession this summer. Behind a span of white roadsters they drove over the highways, making note of every crossroad where there was no guide post. If the county happened to be one in which guide posts had been petitioned for, according to a law enacted several years ago, the absence of posts was reported. The secret of the young men's diligence lies in the fact that half the fine of $10 against highway commissioners for failure to erect posts goes to the complainant. It is reported that they made $15 to $20 a day and thoroughly enjoyed themselves, besides benefiting travelers.

Chicago Track Elevation Bridges.

The Chicago & Alton railway, which is elevating its tracks in Chicago from Eighteenth-st. to Western-ave. boulevard, is constructing all retaining walls and bridge abutments of concrete. For a part of the distance, however, an ordinary embankment is built, without retaining walls. The filling is of sand, and the streets are crossed by plate girder bridges having floors of creosoted plank, covered with stone ballast.

Railways Must Pave Sidetracks in St. Joseph.

The city engineer of St. Joseph, Mo., will be instructed to enforce the provisions of agreement with railroad companies to pave alleys where they have sidetracks. Neither the Rock Island or the Chicago Great Western roads have complied with these provisions, and if the engineer found it necessary he could tear up these tracks.

THE OHIO MUNICIPAL SITUATION

The reason for the present condition of municipal governments in Ohio and the arguments for the various forms of municipal codes presented for consideration at the special session of the legislature now sitting are well stated in the following abstract from a paper by Mayor W. B. Doyle of Akron, O., before the recent convention of the League of American Municipalities.

Briefly the status is this. There is not at the present time a legally constituted city in the state, not a city with a valid charter. The legislature of the state has been convoked in extraordinary session by the governor. It met first on Aug. 25. It was called for the only purpose of enacting a code of laws for the organization and government of the cities and villages of the state. Until it shall do this there will exist only de facto governments in all of them.

Two recent decisions of the supreme court of Ohio are the apparent cause of all this trouble, since they demolished the elaborate scheme of the classification for cities and villages which had long served as a pretext for the passage of special and local laws, in violation of the constitution, pulverizing the foundations upon which every city government in the state has been erected.

These decisions were only the apparent cause of the disaster. The real cause dates back nearly fifty years to the making of the initial error. These decisions were only a thunder-storm that restored a foul atmosphere to its former purity.

The real muddle began after the census of 1890 was taken. The classification was made on a basis of population. When the census returns were published it was learned that many cities had so increased in population that they were entitled to rank as cities of a higher grade, and in some cases, of a higher class than before.

There was an entirely different form of government for each grade. The word grade was a misnomer, it really meant a class, and, instead of two classes with their respective grades, there were, in truth, eleven distinct classes. Every ten years, or oftener, a city might find itself pushed by its own prosperity into another class and equipped with an entirely different charter of powers and governed by entirely different laws, no matter how inappropriate or undesirable they might be. It was a matter of guess-work with growing cities as to which class they would fall into at the next census. If they grew fast they would likely fall into one class; if not so fast, then into another.

It needs many years for a city to adapt itself to a new dispensation of law and the frequent changes would prove very demoralizing.

On the other hand if change and advancement was not possible then the entire scheme failed because laws passed under it would not be general. The legislature squeezed out of this dilemma by leaving the question of advancement to a vote of the people in each village and city entitled to it, after a two-thirds vote by city council that such action was deemed expedient. The supreme court then decided that increase of population ipso facto did not cause a change in grade, but that all the preliminary steps provided by the general assembly must first be taken.

Theoretically, it was possible for cities to advance to other grades; practically, it was not. No city has been willing to throw off its own and assume the form of government provided for another and come under the legislation provided for that other.

One cannot but admire the courage shown by the supreme court in taking its bold stand. To reverse itself in the face of all the adjudications of the past and the constant reiteration that the doctrine in question had been settled for all time and past questioning and in the face, too, of the tremendous consequences sure to follow their holding, certainly required courage. The people of the state must feel their confidence in their highest court reawakened by this fearless and honest averment of past error and present intention to serve right rather than expediency. They said in their opinion in the Yates case, in which they all concurred, published in the Ohio Law Bulletin for Aug. 19, 1902: "We are satisfied at all events that the loose construction of the constitution in which this court has heretofore indulged, is in part responsible for the abnormal condition of things shown above and we feel disposed to distinctly and finally repudiate it now."

The legislature is now in session. They are building a municipal code for the governing of every local community in Ohio. There is deep in the popular mind a belief that safety lies in following the constitution. The great wave of relief that has swept over the state can be ascribed to the feeling of the people that at last it had been decided to go back to the constitution.

The principal code suggested is the administration measure drafted and recommended by Governor Nash and his personal advisers.

It divides municipal corporations into cities and villages, the dividing line being a population of 5,000. It includes a very extensive grant of special powers. It prescribes complete separation of executive, legislative and judicial functions. Under it the chief officers of the city will be mayor, president of council, who is a sort of lieutenant mayor; auditor, treasurer, solicitor, board of public service, consisting of three members elected by the peo-

ple, who shall have charge of all public improvements, make all city contracts and control all public streets, buildings, parks, etc., and lastly a board of public safety, consisting of four citizens to be appointed by the mayor, only two of whom shall belong to the same political party, who shall control the police and the fire departments. Every city must elect a police judge and a clerk. Council enjoys large legislative powers and grants franchises. Solicitor is appointed by the mayor. Council consists of not less than seven members, four elected by wards and three at large, and an additional member may be elected for each additional 15,000 population. The mayor has the power of veto, but no power of removal. After his appointments are made the mayor is little more than a figure-head and he cannot reasonably be held responsible for the condition of the city's affairs, as their conduct is taken out of his hands and intrusted to boards whose members are not answerable to him. The administration code is the embodiment of the board of commission plan.

A second complete code has been presented to the legislature by the state board of commerce. The following excerpt shows its purpose: "II—For the purpose of organizing or reorganizing under this act there shall be elected at a special election, held for this and no other purpose, delegates to a municipal constitutional convention, whose duty it shall be to formulate and adopt a municipal constitution." Municipal corporations shall be cities or villages, according as they adopt municipal constitutions providing for city or village organizations. The executive power is vested in a mayor. The constitution shall provide for such administrative officers as may seem necessary. A council of one body and not less than five members shall exercise legislative power only. Mayor has veto power. Police Judge and Clerk are elected by the people. The measure limits the powers of taxation, assessments, borrowing money, contracting debts and loaning credit. The distinctive feature of this plan, which is that in force in several other cities, notably in California, is the extension of the privilege of home rule.

At the time this is written no other code has been made public, but it is commonly understood that a third will be offered embodying the distinctive features of the so-called federal plan, with power and responsibility centered in one person —the mayor of the city.

It would prove invidious to offer an opinion upon the merits of these respective codes. I will content myself with a statement of a few cardinal principles without which, in my opinion, no code of laws for the organization and government of municipal corporations can attain a large success.

Mayor Seth Low has pointed out that American cities are not so much little states as they are large business corporations. Twentieth century methods of division of labor, of the distribution of the functions of production, have concentrated in the municipality much of the work that was formerly done by the individual or for which he personally contracted. Municipal ownership extends the city's duty in this respect and the modern tendency seems to be in that direction. The citizen no longer carries his lantern when abroad at night, for the city lights his path for him. It lights his store or office and his home with gas or electricity. It furnishes power by which his factory may be operated. That he may conveniently pursue his way, the city sweeps and sprinkles the streets he uses, having first carefully removed hills and filled depressions and paved with expensive materials those streets. By its patrolmen the city guards his property in his absence and protects his person, awake or asleep. If his house catches fire the city has provided elaborate and expensive means to extinguish it and uses them for him. It makes contracts for him upon much more favorable terms than he could obtain for himself and thereby his messages are carried faster than sound itself to any part of the city, and, when he wishes to ride, the same force is used to literally snatch him to his destination.

It is probable that the city will do all these things direct in the years to come, as it does most of them now. Mark that they are all business functions, in the performance of which the city does much buying and selling. For example, enormous amounts of coal and other supplies are necessary in the conduct of municipal lighting and it sells its immense product just as a private corporation would. The hiring and discharging of its policemen, firemen, street force and other employes is a strictly business arrangement. The city government is doubtless the largest business concern in any of the large cities. Now, the large industrial enterprises have found it to be indispensable to the successful conduct of busisess that but one general manager should be in charge of it, clothed with authority and powers ample to perform all that is required of him. He may have his assistants, but they are selected and directed by him and answerable to him. Responsibility for the conduct of the industry centers in him.

I believe this is the first and most important requisite for the successful administration of the affairs of the modern city. The want of it in city charters has been the most prolific cause of misrule. Divided responsibility means that no one is responsible. It bewilders the people, who are unable to locate the ultimate cause of the evils that affect them. The board throws it upon the mayor, the mayor lays it upon the chief of police, and the poor, mystified citizen, dizzy from his rapid circuit of municipal offices, retires to his corner with no satisfaction save that of knowing himself to be an ass instead of a sovereign citizen for voting year after year to permit such a system. It used to be said that divided responsibility was necessary to protect the people. From what? From their own servants! Lord save us!

The mayor should be the one responsi-

ble head, the supreme authority. He should possess absolute control over all those exercising executive power under the city charter. The heads of departments, called by this name or that, composing a board of administration or control or what not, should be appointed by him, held subject to his orders and removal instantly at his will, without confirmation of his action on the part of anybody. He should be made an autocrat in his little realm. I say this in spite of all the popular fear of political machines and bosses.

"When one reflects that in the government of the United States the immense administrative departments, like the treasury and the postoffice, have, from the beginning of the government, been committed to the care of a single man, it seems strange that, in their cities, Americans should have been so unwilling to proceed upon the same theory."

"Too often the duties of the mayor or executive officer are only nominal, and to them he gives but little attention, a natural result of his want of importance, and of his inability to control the administration of municipal affairs. If the office were clothed with dignity and real authority; if the mayor were invested with the veto power, if he had the sole right to appoint and the unrestricted power to suspend or remove subordinate officials or heads of departments, then the citizens could justly demand of him that he be individually responsible for the proper conduct of the concerns of the municipality, and if grievances exist, they would know to whom to apply for remedy, or upon whom to fix the blame."

The second principle is that all legislation for cities must be by general laws. Ohio enjoys protection in this respect by constitutional provision. Public sentiment there should be united in favor of standing by the constitution and of upholding the supreme court in their determination to abide by it.

The third principle embodies what is termed in popular phrase "home rule." It means local self-management—that each small community shall be allowed to manage its own affairs, in its own way. Says Judge Dillon: "As local matters can better be regulated by the people of the locality than by the central power, we provide that each road district, each school district, each city and each county shall, as to its local concerns, be self-governed." Except as the constitution restricts their action, the power of the legislature over municipal corporations is supreme from creation to abolition. It may change, divide, consolidate and provide for them at its own pleasure. This is a defect in our system, and, if such action be necessary, the constitution of each state should be amended so that "the primary and vital idea" of the American system "that local affairs shall be managed by local authorities and general affairs only by the central authority," shall be maintained secure in the organic law of each state.

In the fourth place there should be a clear separation and definition of functions, powers and duties enjoyed and borne by the different departments of municipal government. The city council should be restricted to the exercise of legislative powers. The city streets belong to all the people of the city and why should not grants of rights therein be made by all those who own them? Why should not franchises be left to a vote of the people of the city? All franchises should expire within the life-time of the generation which grants them. A period of twenty-five years is a fair and reasonable limit for any franchise. "Administered on business principles, a city ought to derive large revenues from the use of wharves, from railways occupying streets with their tracks, from gas, water and other companies to which are given the right to lay mains in the streets and public places."

Lastly if municipal corporations are largely business institutions it is self-evident that party politics should have no place in their management. If city government has been the one conspicuous failure in the whole history of the American system, as Prof. Bryce alleges, they who ascribe the cause of it to the manipulation of city affairs for political advantage have much reason to support their constitution. It is unfortunately true that the American system has permitted municipalities to be the foot ball of self-seeking politicians. The opportunity now presented to the legislature of Ohio is a rare and magnificent one. Such a field for the exercise of constructive statesmanship is offered only after long intervals. Not since the municipal corporation act of 1835 in England has there been such a chance to work on so grand a scale for the reform of city government. The one hope of the people of Ohio at the present time is that the legislature will estimate the situation at its true value and, leaving party politics and factional differences and all selfish and ignoble ends behind it, will rise to the hight of statesmanship where broad and noble views may be had of it.

The Senate completed its consideration of the Nash municipal code Sept. 24. Few radical changes have been made in the Nash code by the senate. The board plan of government for cities has been preserved The clause relating to franchises was struck out by the senate and a resolution adopted providing for the appointment of a commission of three members by the governor to investigate the subject and report at the next session of the general assembly. An amendment was adopted providing that councilmen shall be allowed a salary of $100 per annum with $5 additional for each 1,000 inhabitants over 5,000. The bill was reported to the senate with the recommendation that it be passed. A vote is taking Sept. 29, as this number go to press.

The conflict of interest makes progress very difficult. The postponement of the franchise clause for more light is due in

part to the efforts made by the traction interests of Ohio to defeat the clause which provides that railway franchises shall be for twenty-five years, and that every ten years they shall be subject to change at the will of the council of the municipality, which will have the right to regulate the rate of fare or other conditions of travel. Promoters of the traction companies' interests say that they will be unable to finance a road under such conditions; that it practically means a straight ten-year franchise, and no bond buyer would consider the bonds of a road having such franchises.

PUBLIC SERVICE

Water—Light—Sewers—Electric Railways.

Amsterdam's New Storage Reservoir.

A large storage reservoir in the foothills of the Adirondacks, west of Saratoga, has been completed by the water works commissioners of Amsterdam, N. Y. Excepting those on the New York City water shed, this is the largest reservoir in the state. It is one mile and a half long, three-quarters of a mile wide, about fifty feet deep and has a capacity of 1,200,000,000 gallons. Glenwild reservoir is in the town of Providence, twenty-one miles north of Amsterdam, and stands about 1,200 feet above the city. It has been formed by the building of an earth dam with a masonry core wall between two hills across the lower end of a plateau valley, having a watershed area of four and a half square miles. The work was begun two years ago when the Amsterdam board of water commissioners directed its consulting engineer, Stephen E. Babcock, to make the preliminary survey of the Glenwild reservoir watershed. The work progressed rapidly and the reservoir is now an available factor in the city's water supply. Concerning the work Mr. Babcock says:

My examination of the watershed convinced me that the basin above the old Steele timber dam was formerly a natural lake, long since drained by the cutting of a channel between two closely abutting hills. I immediately saw that the lake could be restored to somewhat more than its original proportions by replacing the former natural barrier with an artificial one. To this end I designed an earth dam with a masonry core wall, the subsequent construction of which proved to me that an earth dam with a rubble core may be built, which is absolutely watertight and admits of no seepage whatever below the heart wall. The water now stands within nine feet of the flow line and I can find as yet no indications of seepage.

The dam as built is 450 feet long, being curved in form. The length of its chord is 408 feet and the versed sine of curve, being the distance from the chord line to the center of the curved dam, is thirty feet. It is thirteen feet wide on top and 165 feet at the base, with a front slope of 2 to 1 and a rear slope of 2½ to 1. The water face of the dam is riprapped with stone pavement, hand laid, stone running from ten inches to twenty-four inches deep, and averaging eighteen inches. The rear slope is seeded with specially selected grasses calculated to form a vigorous, enduring sod. The top of the dam is seven feet above the flow line, allowing ample room for wave action. The spillway is thirty feet wide and bottom paved with thin quarry stone, set on edge and grouted with Portland cement. The spillway channel below the spillway is dry paved on the bottom and four feet up the sides with large stone, averaging about two feet square, with double rows of sheet piling placed every twenty-five feet crosswise of the channel to prevent unstarts one foot above the flow line and dermining and wash

The masonry heart wall in cement batters three inches to the foot down to a base width of fourteen feet six inches. Below this point it is hauled into a width of six feet and thus carried down to the bottom. The wall is 63.5 feet high and is composed of broken bowlders, no stone being permitted to exceed one-half a cubic foot in size, being what is known as one man stone, all hand laid in place. The wall is grouted with Portland cement and sand mortar, mixed in the proportion of one part cement to three parts sand, in sixteen inch layers or courses.

The method by which water is drawn from the reservoir is as follows: Three lines of cast iron pipe are carried through the dam at the level of the creek bed. The lower, or mud, pipe may be used to drain the reservoir dry. The other two connect by means of a swing joint, the swivel of which is ball bearing with a twenty-five-inch riveted steel pipe that extends out forty feet into the reservoir. The swing joint makes it possible by suspending by a float to permit the raising or lowering the end to draw water at the elevation of greatest purity, being normally about eight feet below the surface.

Unusual Case of Electrolytic Action at Norfolk, Va.

A sudden and serious shortage in the water supply inconvenienced the city of Norfolk, Va., of late. It was evident that a leak was daily diverting from a million to a million and a quarter gallons of water, but the location of the leak puzzled the water department officials for almost a week. The method of shutting off certain sections of the city finally located the break at the intersection of two streets. Here it was discovered that the six-inch water pipe affected ran through a brick culvert which formed a connecting link between the ends of a 20-inch waste pipe used to conduct hot salt water from the power plant of the Norfolk Railway and Light company. It seems that at the time of laying the railway company's pipe the contractor found it to be exactly on a level with the city water pipe which ran at right angles to their pipe. The difficulty was overcome by cutting out a section of the big pipe and laying a brick culvert. Thus the water pipe was subjected to constant contact with the waste which besides being corrosive was found to be heavily charged with electricity. Either one or both of these causes operated to destroy the pipe resulting in a leak eighteen inches long and of considerable width. City Engineer Brooke states that the damage was caused entirely by electrolysis, the conditions being especially favorable for this action. Pieces of the pipe could be whittled off and crumbled to a fine black powder. The pipe as relaid curves over the waste pipe opening at a distance of several inches above the latter. The intervening space is packed with brick and earth covered with asbestos.

Water Waste and Protection.

The Metropolitan Water and Sewerage board, Boston, Mass., is considering methods for the prevention of water waste. During 1901 the daily consumption was 117 gallons per inhabitant. The last report of the board states that an increase in the next few years corresponding to that which has occurred since the beginning of the operations of the board will require additional sources of supply some ten or twelve years earlier than had been estimated by the state board of health in 1895. The board concluded that, although the cost of determining the amount of water furnished to each city and town in the Metropolitan district would be considerable, such cost would be justified, and the different cities and towns could thus be given a pecuniary motive for enforcing proper regulations against waste. The Metropolitan Water act provided that the annual assessment upon the cities and towns other than the city of Boston should be levied one-third in proportion to their respective valuations and the remaining two-thirds in proportion to the respective populations. A change in this is proposed by the board, so that the assessment should be based one-third in proportion to the valuations and two-thirds in proportion to the quantities used.

The report of the board states that the sanitary inspection of the water shed of the south branch of the Nashua river above Clinton, Mass., preparatory to the storage of water in the Wachusett reservoir, has been carried on in a systematic manner. The water shed has been divided into districts, according to the natural drainage lines of the brooks, and a careful inspection of each district has led to the removal of many cases of pollution arising from defective house drainage and other causes. The camps of the laborers and of other buildings within the reservoir basin have been carefully inspected by the medical inspector and very few cases of contagious diseases have occurred.

Syracuse's Water Supply.

The city of Syracuse is confronted by an interesting problem in connection with its water supply, which comes from Skaneateles lake. The village of Skaneateles, at the foot of the lake, sewers into the water, and has done so for years. The city's intake is farther up the lake, and ordinarily would be considered safe from any danger from the sewage below. But some state jetties are so situated that contaminated water may be blown by north winds so it would reach the city's intake. Therefore, Prof. Landreth of Schenectady, who has just investigated the Skaneateles lake situation, recommends that a sewage disposal plant for Skaneateles, with necessary connections, etc., be erected and maintained at the expense of Syracuse. If Syracuse wishes to get rid of danger from Skaneateles sewage in its water it must pay for it. That seems to be the law in this case.

The report of Prof. Landreth is interesting because it shows that a number of samples of water drawn from Syracuse faucets might be analyzed and make a good showing, while, nevertheless, under certain conditions, polluted water might temporarily take the place of that which had been good. It would be practically impossible for analyses to detect the bad water unless it should happen to be from a bad batch that the analyst's jug was

filled. Ordinarily the city water would be wholesome; once in a dozen of fifty times it might be unwholesome. A series of analyses would show different qualities of the water on different days, but there would be no assurance of security at any time.

Inclosed Arc Lamps Improve Washington Light.

In his annual report to the commissioners of the District of Columbia, Walter C. Allen, electrical engineer, stated that the greatest improvement in the public lighting during the year was the substitution of arc lamps of the inclosed type for the old style open lamps. The entire system of lamps has not yet been changed but the work will be completed within a few months. During the year 193 additional gas lamps were erected and also a large number of naphtha lamps where the gas mains have not yet been extended. Wherever the extension of the gas piping has made it possible, naphtha lamps have been changed to gas.

Growth of the Electric Railway System.

Some statistics bearing on the subject of electric railways have recently been issued from the census bureau. In 1890 the street railway companies in the United States numbered 7,809 of which 144 were electric. At that time there were 2,895 electric cars in use out of 32,505 of all kinds. By 1899 the number of street railway systems was over 850, chiefly electric and 50,658 electric cars were in use.

The saving effected by the adoption of electricity is indicated by the annual report of the Metropolitan Street Railway company of New York for the year ending June 30, 1900. The Metropolitan employs the slot system of operation, the most expensive electrical method known. From this company's figures it appears that the cost of operating with the cable per car mile was 17.76 cents; with the horse, 18.98 cents, and with the electric motor, 13.16 cents. In the earlier days of electric railways a car with a pair of small motors of fifteen horse power each was considered well equipped, but at present the average per motor is generally over forty horse power.

The Public Needs of Mason City, Ia.

According to the annual address of Mayor Norris of Mason City, Ia., the city has had an almost phenomenal growth in population and industry and has now reached a point in its development when many public improvements must be made. He mentions sidewalks and street pavements of which the city now has none, a complete system of sanitary sewerage, the present sewers of ing quite inadequate, new pumping machinery for the water works, the present pumps being old and there being no reservoir for use in case of accident, and a new city hall, the present quarters being inadequate and not fire-proof.

The meter system has recently been adopted by the water works and is expected to aid somewhat in the solution of the water problem, excepting the need of new pumps. It has not yet been in operation long enough to show what effect it will have on the revenues and on the consumption of water.

Public Improvements in Muscatine, Iowa.

Muscatine is a city of 15,000 population and has seventy-five miles of streets. A number of new streets, making shorter routes between certain points have recently been opened. During the last fiscal year 1.06 miles of brick street and alley paving were laid on a six-inch sand foundation at $1.95 a square yard for the pavement, 23 cents a cubic yard for excavation, 48 cents a foot for street curbing and 34 cents for alley curbing of Ohio sandstone. The total cost was $25,553 for 16,968 square yards of pavement. The city now has 8.91 miles of paving, or 177,365 square yards, the average cost of which, including 5 cents a square yard for rolling out grade by city roller, is $1.07 a square yard. The refuse of clam shells from the many button factories in town is used for improving many streets by using twelve inches thickness of shell layer and three inches of gravel or cinders for a filler on top, all being thoroughly rolled. Six thousand loads of the shells are used a year at a cost of $3,600.

The city has been paying $1.32 for arc lights and $19.20 for gas lights and gasoline, but, the contract expiring this year, it is renewed at $74 for 2,000 candle-power arc lights all night and $64 for those burning until 1 o'clock.

The city purchased its water works in 1900 and the report shows the operation for the first year of municipal ownership. The purchase price of $100,000 is in 4½ per cent. bonds, payable $5,000 each year. Receipts during the year were $21,492 and expenditures, including maintenance, operation and one block of new main, were $13,162, leaving a balance of $11,226 which could be applied on indebtedness ($5,000) and interest (about $4,500).

The city engineer's office cost $2,365, including his salary of $1,200.

Improvements of Waterloo, Ia.

The city of Waterloo, Ia., has made great strides in recent years. According to the annual address of Mayor P. J. Martin it has eighty-one miles of streets, five and a half miles of which are paved with brick, forty miles of cement sidewalks, eight miles of street railway, interurban railway to Denver, fifteen miles, nineteen miles of sewers on the combined system.

A sewer to cost $5,000 is under construction, also a Melan arch bridge, costing $60,000, of which the city pays $35,000 and the county $25,000. The indebtedness of the city has been reduced during the year over $14,000. "Tax ferrets" have unearthed from $18,000 to $20,000 of taxes not paid, which increases every city fund and makes possible the purchase of a Gamewell fire alarm service at a cost of $3,700. The city engineer has the highest salary of any official, $1,200, the city marshal receiving $900, the mayor $800.

Waterloo is fortunate in its prices for municipal service, 69 hydrants costing $40 each per annum and 112 being charged at $37.50, while lights cost $66 each for thirty-five arc lights and $21 each for 198 gas lamps.

The water company has rebuilt its pumping station and filter house, laid over two miles of mains and added thirty hydrants during the year. The plant is now worth $170,000 and mayor Martin thinks it will pay the city to purchase it as soon as it becomes a city of the first class and thus obtains the power to do so. The Gas and Electric Company has also rebuilt its plant and laid new mains at a cost of $150,000. The city pays the Water Company $5,822 a year and the Gas and Electric Company $7,404. Under the new franchise private electric service costs 16 cents per 1,000 watts and gas $1.35 per 1,000 cubic feet, rates which are not very low.

The city receives $15,750 a year from licenses, mainly from sixteen retail liquor saloons at $900 each.

PUBLIC SAFETY AND CONVENIENCE

Fire—Police—Improvement Associations—Municipal Housing.

Fire Department Statistics.

Washington's fire department has been receiving some little criticism of late. It seems that both as regards alarms and apparatus Washington cannot stand comparison with other large cities. Congress must be blamed for this state of affairs and its inaction may lie in the fact that as yet there has been no big fire in any of the executive departments. Should one of these buildings burn congress would see to it that the department be as completely equipped and its men as well paid as in other cities of its class.

A table comparing salaries paid in various cities shows Washington far below the average. It is as follows:

City.	Chief.	Depy. Chief.	Foremen.	Privates.	Engineers.
New York	$6,000	$5,000	$2,160	$1,400	$1,600
Chicago	6,000	4,500	1,650	1,050	1,300
Philadelphia	3,600	2,500	1,250	1,095	1,095
Boston	3,500	2,400	1,600	1,200	1,300
St. Louis	4,000	.....	.....	1,080	.....
Baltimore	2,000	.....	1,100	900	1,100
San Francisco	4,000	3,000	1,440	1,200	1,350
Cincinnati	3,500	2,200	1,260	1,080	1,200
Buffalo	3,000	2,200	1,100	900	1,000
New Orleans	3,000	.....	900	720	900
Detroit	4,000	2,500	1,200	900	1,150
Milwaukee	3,600	2,100	1,200	960	1,200
Louisville	2,500	.....	1,000	.....	1,095
Atlanta	4,000	1,400	1,200	.....	1,080
Washington	2,000	1,200	1,000	840	1,000

This shows a large discrepancy regarding almost every office, though Baltimore is in about the same class as Washington. Atlanta, Ga., a city not half as large as Washington, pays its chief twice as much and all the other officers receive better pay than those at the capital.

Regarding apparatus Washington remains at the bottom of the list with the exception of Atlanta, as the table shows:

City.	Steamers.	Trucks.	Chemical Engines.
New York	145	42	..
Chicago	91	27	3
Philadelphia	50	12	5
Boston	45	17	12
St. Louis	53	companies in all	
Baltimore	21	11	7
San Francisco	37	9	7
Cincinnati	28	13	7
Buffalo	28	10	6
New Orleans	27	8	14
Milwaukee	20	8	8
Louisville	17	5	4
Atlanta	5	3	2
Washington	14	6	4

Milwaukee is a city of about the population of Washington, which has a much more complete department, though it does not possess the class of public buildings and is not nearly so important.

Other cities make equally good showings, but in view of the fact that Washington's great public and private structures are constantly increasing the time will not be long until congress will raise the standard of the department on a par with the territory to be guarded.

Non Partisan Police.

At the recent meeeting of the National Prison Association at Philadelphia, Major Sylvester, superintendent of police at Washington, presented an important report on police forces in cities. The report dwelt in part on the need of eliminating politics, Cincinnati being named as an example of a city with a non-partisan police department. It is unfortunate for the city that must have its force dependent upon the success of elections. Loss of life and property, unsanitary conditions, disorganizations and bad order will prevail where proper enforcement of law entails removal, reduction or transfer for him who endeavors to perform his duty in a conscientious manner.

Major Sylvester also spoke on the subject of a national bureau of criminal identification. During the last session of congress a bill was introduced in both branches, and favorably reported by the judiciary committee of the house of representatives, which provided for the establishment of such a bureau in connection with the department of justice in Washington, at an annual expenditure of about $24,000.

The measure contemplated the appointment of a superintendent and assistants, who were to receive measurements, descriptions, photographs and all kinds of information concerning criminals, their kind, places of rendezvous, practices and movements. This was to be forthcoming from cities and towns upon the legal authority of those charged with such work, who were to receive in exchange, and upon official request, all such photographs and information as might be needed in the pursuit of their legitimate calling.

Improvement Associations.

A betterment of London Association has been established recently with the laudable object of abating nuisances. The association is piloted by a lord and its program includes the suppression of street noises, the more conspicious posting of street names, a movement against the "constant digging up of the highways to the great inconvenience of the public," the banishment of idlers from railway stations, as well as a determined crusade against the thousand-and-one incidental evils of city life. Associations of this sort in American cities might tend to mitigate the "strenuosity" of modern life. A number of such societies exist in the smaller cities and towns, and their combination in the league of public improvement associations may tend to increase their number and scope.

The Commercial club of Minneapolis, Minn., is offering prizes for planting and beautifying home grounds in that city during 1902. An illustrated folder has been issued, giving directions for planting trees. The city is divided into six sections, and thirty-six prizes with a total value of $180 will be awarded. Of the prizes, twenty-four are for the best kept and most attractive front or back yard or premises owned or occupied by one whose salary does not exceed $1,200 per year, and twelve children's prizes of $5 each are to go to the six boys or six girls for the most attractive flower beds during the summer and early fall.

With a sudden burst of enthusiasm the village of Sewanee, Tenn., has resolved to improve itself. The movement received its impetus quite recently when Dr. Wiggins of the University of the South, delivered a lecture on "Village Improvement," outlining the plan whereby dead villages in New England have been made over into prosperous towns. The talk aroused great enthusiasm and almost the entire village formed itself into a society for the betterment of conditions. As soon as the society goes to work in real earnest some unknown benefactor will contribute $1,000 per annum toward the movement. No doubt Sewanee will blossom like the rose in the near future.

Public Tenements in England.

Many English city corporations are erecting homes for working people. Streets are widened and slums are being built up with sanitary tenements. London now has a special housing department connected with the city government and has 60,000 people in its tenements. Birmingham is another city which has done much to better the surroundings of the lower classes. The city has erected a number of flat buildings, some of the rents being so low as 75 cents per week.

Rules Governing a Model Municipal Lodging House.

As the matter of establishing municipal lodging houses is being discussed in a number of cities, it is of some interest to note the rules for the conduct of the lodging house at Washington, D. C. This has been established for more than thirty years and is considered the model of its kind in the United States. The rules as

laid down by the district commissioners are:

1. The house will be opened from 6 a. m. to 10 p. m., except for those who have registered, who are required to return by 8 p. m.
2. Breakfast served at 7 a. m. Dinner from 5 to 6 p. m.
3. No person under the influence of liquor will be admitted.
4. All applicants admtited will be required to saw one-eighth cord of wood for supper, bath, lodging and breakfast.
5. No person may remain longer than three days.
6. All persons having stayed one night and wishing further accommodations are required to report not later than 2 p. m.
7. All meals for Sunday must be worked for on a week day.
8. At the sound of the gong at 10 p. m. all talking will cease.
9. All valuables must be left at the office.
10. Any violation if the rules will debar a person from the house.

MUNICIPAL AND TECHNICAL LITERATURE

Books—Society Publications—Municipal Reports.

New Publications.

Sewage and the Bacterial Purification of Sewage. By Samuel Rideal, D. Sc., 308 pp. Cloth, $3.50. New York: John Wiley & Sons.

Like the author's book on "Water and Its Purification," this volume bears the evidence of preparation by a chemist engaged intimately with the analysis of sewage and the products and processes of sewage purification works. It gives a resume of the numerous reports of experiments upon and of works established for the purification of sewage, including the author's own work upon the problem, and shows he has become very familiar with the subject from close connection with the study of the chemical side of it.

The book does not consider the engineer's side of the question, but is of great value to the engineer in giving him a good description of the methods of analysis used to test the results of the structures he designs, a general view of the principles upon which the design of plants using various processes should be based, and sketches of many of the systems in use, in each case giving the results of chemical and bacteriological tests and studies.

After a preliminary historical chapter, two chapters consider the methods of making sanitary chemical analysis of sewage and effluents of sewage treatment plants. Two chapters consider the ordinary bacterial tests and the chemistry of bacterial action. These are followed by chapters upon the various methods of sewage purification by irrigation or sewage farms, subsidence and chemical precipitation, sterilization, bacterial purification in tanks and filters of various sorts. The last chapter discusses the agricultural value of bacterial effluents, some mechanical details and the treatment of trade effluents.

The point of view is always that of the chemist and the book is an excellent epitome of progress in sewage purification from this side. The difference between English and American conditions is emphasized sufficiently to make the book more valuable to American engineers than some other English books. Less space is given to the older methods of purification not applicable to American conditions without great modification and more to the modern methods in the application of which the principal difference is found in the strength of sewage in the two countries.

Irrigation in the United States. By Frederick Haynes Newell, Chief of the Division of Hydrography of the United States Geological Survey. 417 pp. cloth, 156 illustrations, $2 net; postage, 20 cents. Thomas Y. Crowell & Co., New York.

The utilization of the millions of fertile acres in the West, which lack only water to be able to support a vast population, is the subject of this book, which is written by the man who is probably best fitted by long study of the subject to give a clear and comprehensive view of the important questions involved. The general reader is the ostensible object at which the book is aimed, and he will find it an interesting and instructive statement of the general principles upon which the methods of irrigation depend, of the many forms of structures and apparatus necessary for gathering and distributing water under the various existing conditions, both in large work af-

fecting many land owners and in diversions of water for single plantations.

After a consideration of the conditions of arid lands, Mr. Newell discusses the methods of utilizing surface waters, including chapters on methods of measuring flow, conveying and dividing waters, storing and details of applying to land. Underground waters and methods of utilizing them for irrigation take up two chapters. The advantages and disadvantages of irrigation are discussed in a very interesting chapter. The differences between the legal views of streams in humid and in arid regions are very clearly shown. Two chapters describe the progress of irrigation and the differences in conditions and methods in the states of the arid and the semi-arid regions, and one chapter explains the advantages of provision for irrigation when needed in regions where the rainfall is usually sufficient or excessive.

While there is no direct argument for national control or construction of the large projects for conserving water for irrigation purposes, aside from extracts taken from speeches and reports of the president and the secretary of the interior, the conclusion is inevitable that this is the only method of securing any reasonably satisfactory development of vast regions now entirely unavailable. The distribution of this book among those interested in irrigation, practically or theoretically, will do more to remove existing prejudices and to show the scientific necessities of the case than any number of political speeches. This is true because the book comes from one whose interest in the subject comes only from thorough scientific study of the problem, and is so logically put together that its conclusions are inevitable.

Water and its Purification. A Handbook for the Use of Local Autnorities, Sanitary Officers and Others Interested in Water Supply. By Samuel Rideal, D. Sc. With Numerous Illustrations and Tables. Second Edition, Revised and Extended; 346 pp.; $2. J. B. Lippincott Company, Philadelphia, Pa.

The characters of the technical books issued in England and in the United States follow nearly parallel lines. Mr. Rideal's English book is quite similar in its general purpose to Mr. Mason's American book upon a like subject and his qualifications for his task are of the same nature. His method of treatment is somewhat different, and the result, considered in connection with English conditions, is somewhat more satisfactory. The chapters upon household filtration, softening of water, analysis and interpretation of results, show great familiarity, as an analyst and water examiner, with English conditions and the methods of testing them. The conditions are so similar in this country that these chapters are practically as valuable here as in the district for which they are written.

The earlier chapters of the book, on character of natural waters, animal and vegetable impurities, the various sources of water supplies and the character of their contamination, distribution and purification on a large scale, are apparently written by an observer and student, after the fact, rather than by one who is familiar with the actual conditions as they occur in all their forms and with the engineering questions which arise. They are written by the analyst who handles the water in its final condition rather than by the engineer-chemist who has followed the water from its original source and seen the reasons for its condition and possibly modified its course. The character of geological formations and the conditions of rainfall, pollution, etc., are different enough to make these chapters less applicable to American conditions. A study of them will be found valuable as giving a knowledge of what many others have discovered in these lines and methods of attacking any specific problem.

Publications of the National Municipal League. Clinton Rogers Woodruff, Secretary, 121 S. Broad-st., Philadelphia, Pa.

Pamphlet No. 8 contains J. Horace McFarland's paper on "Harrisburg's Advance," a lesson to smaller municipalities in beautifying themselves, which was presented at the recent conference of the league in Boston. Another pamphlet gives the second report, made at the same meeting of the committee on instruction in municipal government in American educational institutions. Thomas M. Drown, Chairman.

Pamphlet No. 7 explains the basis of the well-known "Municipal Program." Copies of these pamphlets can be obtained of the secretary.

Handbook for Street Railway Engineers, containing geometrical and trigometrical formulae, transition curve tables, track construction tables, strength of wooden beams and columns, electrical formulae and tables and much other information invaluable in street railway design and maintenance. By H. B. Andrews, C. E. 202 pp. small pocketbook size, morocco, $1.25. John Wiley & Sons, New York.

The sub-title describes the contents of the book which very successfully carries out its intention to present in compact form the information and tables needed most frequently by the street railway engineer. The author's practice has shown

his needs and he assumes that they are the needs of others. The common formulae in mensuration, trigonometry and railroad curves are given, and those for determining the overhang of cars and elevation of rails. An excellent system of transition curves is presented, and a simple method of laying out a curve without a transit. Tables of materials required for track construction, specifications for paving, cost of each item of track construction in detail and chemical composition of rails have been checked and are believed to be accurate. Standard weights of cars and bending moments of same on various spans are shown by diagrams. Tables of strength of various materials in various forms, weights of materials, timber measurement, earth work for single and double track, electrical elements of wire, effects of temperature, strength and weights of wire, methods of calculation of wire systems and of power required for railway system are given in three chapters. There is an essay on aluminum as an electrical conductor; also one on railway storage batteries. Tables of rail curvatures, circular arcs, chords, natural and logarithmic angular functions and conversions take about fifty pages, and the last two pages give a detailed analysis of the expenditures of Massachusetts railroads for all items of cost of operation, maintenance, repair and fixed charges, reduced to percentages of the gross income. The book is certainly a great convenience to the street railway engineer, in size, form and contents, and deserves a large circulation.

Proceedings of the Forty-second annual meeting of the American Water Works Association, held at Chicago, 1902. Published by the secretary, John M. Diven, Elmira, New York.

The publication of this 363 page volume of the proceedings of a convention held in June so quickly is very creditable. Many valuable papers are included in it and the interesting discussions upon them are printed in full from stenographic notes. It has not been deemed desirable to edit the stenographer's report so that it is sometimes necessary to wade through considerable talk upon subjects of interest only on the day of the meeting, but the good material is to be found if one wants it and will look for it. The rule preventing publication of papers elsewhere before their appearance in the proceedings seems to prevail in the society and has only been broken in one or two instances in the present volume. Our readers who are not members of the association will see the best of the papers and discussions in these pages from time to time.

Municipal Reports.

Mayor's Message and Annual Reports of City Officers for Year Ending March 31, 1902. City of La Salle, Ill. M. J. Charley, Mayor.

Although the printer's work in arranging the reports is not well done the reports themselves are very satisfactory. They show co-operation in the various departments, so that each report gives the details of expenditures in that department, the city clerk's report shows the balance sheet of expenditures and receipts for each fund, and the mayor's report and message give the general view and recommendations for future action based on the condition of the city as shown in the reports.

The condition of the city in many respects is excellent. It has a population of about 10,000, and over 26 miles of streets. On these streets are over 19 miles of sidewalks and 114,861 square yards of brick paving, equivalent to about 5.5 miles, 36 feet wide. There are over 15 miles of sewers, serving about 70 per cent. of the city's population—an excellent showing. The city engineer, E. J. Noonan, reports failure of citizens to make connection with sewers, and recommends strong measures against the use of outside closets and cesspools. There is an apparent lack of records and of adequate inspection of public work in the past which the engineer is making strong efforts to fill.

The water works superintendent, Jos. F. Kilduff, reports a profit on the operation of the works during the year of $5,008, which went to reduce the overdraft of the preceding year of $5,368. The receipts include $3,500 from the general fund for 100 fire hydrants and $3,500 from the lighting fund for power furnished to that department. The expenditures include about $1,000 for new pipe laid, $674 for new meters and $1,519 on plans, etc., for proposed extension; also $1,212 for interest on bonded debt. The principal complaint is that the consumption is 186 gallons per capita per day for the 8,000 persons estimated to use the water. The superintendent urges meters to reduce the waste and the mayor in his message makes a strong and sensible plea for them.

The light department is in charge of the fire marshal, George A. Wilson. Including the credit to the water works for power, the expenses were $6,084, including $138 of the fire marshal's salary, pay of trimmers and supplies. If the depreciation in the power station is allowed for in the payment for power only the depreciation in wiring and lamps is neglected in computing the cost of the ninety-nine lamps in use at $53.32 per annum,

materially below the average of $65 to $70 for cities of this size. The first supposition can be determined by comparing with the cost of power in other cities of like size.

Annual Report of the City Secretary, Sherman, Tex., for Year Ending March 31, 1902. E. M. Kearney, Secretary.

The report is a sort of balance sheet of the various funds of the city from which it is not easy for one unacquainted with the city to determine the exact amount and character of expenditures. If accompanied by detailed reports of the various departments this report, acting as a summary, would be quite satisfactory.

From the table of assets of the city it is to be inferred that the school buildings and property have cost $107,031; water works plant and artesian wells, $149,052; electric light plant, $10,000; city hall, $20,000; fire apparatus, $14,247; sewers, $69,936. However, there are $78,000 of sewer bonds outstanding in addition to $59,000 water works bonds, $56,585 of railroad bonds, $29,000 of funding bonds and permanent improvement bonds enough to make the bonded indebtedness of the city about $300,000. The water works fund account indicates $16,764 receipts and $18,119 expenditures. The sewer fund account shows cash on hand of $13,892. Water works improvement cost $8,630. There seems to be no lighting account.

ORGANIZATIONS AND INDIVIDUALS

Technical Meetings.—Personal Notes

Technical Meetings.

The eighteenth annual convention of the Edison Illuminating companies was held at Mt. Pleasant House, N. H.

The twentieth annual convention of the New York Street Railway Association was held at Caldwell, N. Y., Sept. 8 to 11.

The fifth annual convention of the National Firemen's Association was held at Detroit, Mich., Sept. 11, 12 and 13. Officers were elected as follows: President, George C. Hale, Kansas City, Mo.; treasurer, H. S. Salisbury, Whitewater, Wis.; secretary, D. W. Gillan, Chicago.

The annual convention of the Pennsylvania Street Railway Association was held at York, Pa., Sept. 10 and 11. Among the papers read were the following: "The Most Economical Management of the Repair Shop," by Charles S. Banghart of Reading; "The Track Construction of Suburban and Interurban Electric Railways," S. S. Hoff, Reading. Officers were elected as follows: President, E. H. Davis of Williamsport; first vice-president, Edward Bailey, Harrisburg; second vice-president, W. W. Griest, Conestoga; secretary, Charles H. Smith, Lebanon; treasurer, W. H. Lanius, York; executive committee, E. H. Davis, C. H. Smith, B. F. Meyers and John A. Rigg.

The State Good Roads Association will hold its annual reunion at Lexington, Ky., Oct. 21 and 22.

The mayors of the towns and cities in Georgia will hold a convention in Atlanta, Oct. 14 and 15. Mayor Mims, Atlanta.

The tenth annual convention of the Pacific Coast Association of Fire Chiefs will be held in Victoria, B. C., Oct. 7 to 10.

The convention of the Indiana Municipal League will be held in Madison, Nov. 12, 13 and 14. The officers of the league are: President, George L. Downey, mayor of Aurora; first vice-president, Ellison D. McGuire, mayor of Madison; secretary, George Harper, city clerk of Madison; treasurer, L. W. Mellette of Elwood.

The twenty-first annual meeting of the American Street Railway Association will be held at Detroit, Mich., Oct. 8, 9 and 10. Papers will be presented on the following subjects: "The Registration of Transfers," "Benefit Associations," "Discipline of Employes by the Merit System," "The Transportation of Light Express and Parcel Delivery," "Steam Turbine Engines," "Signals for Urban and Interurban Railways," and "The Adjustment of Damage Claims."

A movement has been inaugurated by the Alabama Chiefs of Police Association for the organization of a southern association of chiefs of police. The states of Texas, Arkansas, Louisiana, Alabama, Mississippi, Georgia, Florida, North Carolina, South Carolina, Virginia, West Virginia, Kentucky, Missouri, Oklahoma and Indian Territory will be included. The purpose is to bring the chiefs of police of the different cities into closer touch with a view to more efficient work.

The American Gas Light Association will hold its annual convention in New York, Oct. 15-17. A. E. Forstall, secy. N. Y. City. Among the papers to be presented are the following: "Some Notes on Cement Masonry," by Mr. I. N. Knapp, Philadelphia, Pa.; "The Care and Maintenance of Incandescent Gas Burners," by Mr. McDougald Dexter, Columbus, Ga.; "The Cleaning and Repairing of Gas Stoves," by Mr. George S. Clarke, Kansas City, Mo.; "Gas Rates and a Franchise

Tax," by Mr. George McLean, Dubuque, Ia.

The seventh annual convention of the International Association of Municipal Electricians will be held at Richmond, Va., Oct. 7, 8 and 9. Papers will be presented as follows: "Municipal Inspection and Control," Walter M. Petty, Rutherford, N. J.; "Relation of Electrical Interests to Other Branches of the Municipality," Capt. William Brophy, Boston, Mass.; "Classifying of Records of Electrical Departments and Standard Specifications for Supplies and Contracts," Edward F. Schurig, Omaha, Neb.; "Report of Committee on Rules for Electrical Inspection and Control, Especially with Reference to the Occupancy of Streets," Morris W. Mead, Pittsburg, Pa.; "Joint Use of Conduits," Charles F. Hopewell, Cambridge, Mass.; "The Telephone Service in Connection with Fire and Police Signal Systems," Jerry Murphy, Cleveland, O.; "Electrical Government in Small Cities," A. S. Hatch, Detroit, Mich. Charles F. Hopewell, Cambridge, Mass., will also give his illustrated lecture on "Fire and Police Telegraphs."

Tennessee Mayors' Convention.

The League of Tennessee Municipalities will meet in annual session in Nashville the 8th day of October.

There are 119 incorporated towns and cities in Tennessee. All of these will be invited to have representatives at the meeting and become members.

The officers of the league are:

President—Hon. James M. Head, Nashville.

First Vice-President—Joseph Wassman, Chattanooga (ex-mayor).

Second Vice-President—W. A. Fowlkes, jr., Dyersburg.

Third Vice-President—W. D. Cameron, Columbia.

Secretary and Treasurer—Jas. W. Blackmore.

The permanent committees of the organization are:

Street Paving—J. J. Williams, mayor of Memphis; Horace M. Carr, mayor of Harriman; W. D. Cameron, mayor of Columbia.

Street Lighting—W. B. Young, mayor of Clarksville; J. H. Underwood, mayor of Clinton; J. W. Blackmore, mayor of Gallatin.

Sewerage and Sanitation—W. H. Gardner, mayor of Union City; J. J. Williams, mayor of Memphis; Horace M. Carr, mayor of Harriman.

Water Works and Water Supply—Joseph Wassman, ex-mayor of Chattanooga; J. H. Crichlow, mayor of Murfreesboro; H. C. Anderson, mayor of Jackson.

Taxation and Assessment—W. D. Cameron, mayor of Columbia; S. E. Stevenson, mayor of Covington; Joseph Wassman, ex-mayor of Chattanooga.

City Government and Legislation—J. W. Blackmore, mayor of Gallatin; John B. Carroll, mayor of Tullahoma; W. H. Gardner, mayor of Union City.

Disposition of Garbage and Street Cleaning—H. T. Stratton, mayor of Springfield; J. H. Underwood, mayor of Clinton; W. A. Fowlkes, mayor of Dyersburg.

Municipal Franchises—H. C. Anderson, mayor of Jackson; W. B. Young, mayor of Clarksville; J. J. Williams, mayor of Memphis.

Municipal Boookkeeping — W. A. Fowlkes, mayor of Dyersburg; W. D. Cameron, mayor of Columbia; H. T. Stratton, mayor of Springfield.

Personal Notes.

Howard Smith has been elected city civil engineer at Delphi, Ind.

J. H. McKee, city engineer of Wilmington, N. C., died suddenly Sept. 6.

J. C. Dolman has been elected councilman to succeed Edward Sweeney, resigned, at Kokomo, Ind.

William Edmond Curtis has been appointed a member of the aqueduct commission of New York City, succeeding the late Maurice J. Power.

W. G. Stone has been elected president and H. S. Patten secretary and general manager of the Whitesboro Water Works Company at Whitesboro, N. Y.

Samuel W. Sessions, formerly a member of the water works board and of the park board, Cleveland, O., died in the city, Sept. 9, aged seventy-two years.

Thomas H. Hayden has been elected acting superintendent of the Kentucky and Indiana Bridge and Railroad Company to succeed B. S. Josselyn, resigned.

Bloomington, Ind., is at present under a democratic regime for the first time since its incorporation. Mayor Dunn and City Engineer Frank E. Deckard are two of the new officials.

George F. Aldeman, the newly-elected mayor of Goshen, Ind., was chosen on a liberal policy. His popularity is shown by the fact that he was elected mayor, although the republicans elected eight of the ten councilmen.

R. M. Waite, secretary and treasurer of the United Gas and Electric Company, has been elected president of the Indiana Water Company at New Albany, Ind., succeeding Frederick A. Harris of Chicago.

J. D. Cook, C. E., died at his home, 824 Erie-st., Toledo, O., Sept. 17, of apoplexy. Mr. Cook was a prominent engineer, having built sixty-three water works systems in as many cities. During the latter years of his life he practiced as a consulting engineer.

The mayor, clerk, city attorney and ten aldermen of Manistee were cited to appear in court the last of September in answer to a charge of contempt of court in having ordered a payment made to the superintendent of street paving, F. W. Todd. An injunction issued some time ago was said to have rendered the warrant for payment illegal.

Among the Indiana mayors who took office Sept. 1 are Jerome Clark, Frankfort; Jesse B. Williams, Wabash; D. D. Coffee, Decatur; Abraham Schwaninger,

Jeffersonville; F. H. Robinson, Delphi; J. U. Dixon, Franklin; H. C. Steeg, Terre Haute; N. Loughraun, Lebanon; B. W. Parker, Columbus; D. C. Anderson, Huntington; J. H. Smith, Bedford, and T. W. Hutchens, Winchester.

Professor I. O. Baker of Champaign, Ill., is preparing a new book on roads and pavements which is promised about Dec. 1. Professor Baker is well known as a writer upon this subject as well as upon masonry, on which he is high authority, and has some ideas which differ from the general opinions. Undoubtedly the book will give full reasons for its existence and show its author's customary scientific research and careful statement.

Mr. J. Howard Ewald, 83 Laclede building, St. Louis, Mo., has been appointed sole agent for southern Illinois, Missouri and Texas, for the Scaife and We-Fu-Go Water Softening and Purifying Systems. These systems are manufactured by Wm. B. Scaife & Sons' Company, Pittsburg, Pa. Mr. Ewald has been for years identified with the iron and steel industries in this section and is well known in manufacturing and engineering circles. He has made a special study of the subject of water purification and is abundantly able to take care of this line of work, being expert on the subject of water and its purification.

The people of Kokomo, Ind., feel some little pride in their new mayor, Macy A. Brouse, who took office the 1st of September. Mr. Brouse is quite a young man, but has taken an active interest in municipal affairs for some years as a member of the city council. He favors municipal ownership of public utilities to some degree, and his decided opinions regarding city government were indorsed decisively at his election when he received an unusually large majority. In his inaugural message Mayor Brouse dwelt largely on street improvement, which is needed in the city. Water works, street lighting and the city debt were other subjects to which he called attention.

Firemen of Rockaway, N. J., consider the mayor of that borough entirely too zealous. The fire companies were holding the regular monthly business meeting one night recently when his honor, George W. Stickle, decided to test the efficiency of the department. Accordingly he turned a false alarm, to which the department responded in record-breaking time. However when the scene was reached and the firemen found that they had only been put through their paces, some of them gave vent to unparliamentary language. An indignation meeting was held, and a search of the city's ordinances revealed the fact that any one giving a false alarm of fire should be penalized in the sum of $50. A resolution was passed, and it may be that a complaint will be lodged against the mayor.

Mr. James W. Copeland of No. 934 Equitable building, Denver, Colo., has been appointed sole agent for the state of Colorado for the Scaife and We-Fu-Go Water Softening and Purifying Systems, manufactured only by Wm. B. Scaife & Sons Company, Pittsburg, Pa. Mr. Copeland was formerly located at St. Paul, where for a number of years he was one of the most successful manufacturers' agents of the city. He has recently opened an office in Denver to further the various interests which he represents, and is well known throughout the West in mechanical and engineering circles. Mr. Copeland has always given the subject of water purification considerable attention, and is particularly well versed in this line. He is, therefore, well fitted to take charge of this new department, to which he will give his special attention.

MACHINERY AND TRADE

Quick Couplings for Quick Firemen.

A noteworthy exhibition of speed was given in Salem, O., on Labor day in the "hub-and-hub" service race between the rival hose companies of that city. The run was somewhat more difficult than such contests usually are. The men lined up 150 yards from the judges' stand and twenty-five yards behind their hose carts. At the signal the two companies sprinted to their cars, seized them and ran, laying the hose as they went. Four sections of hose (200 feet) were laid by each. Immediately, however, the first section laid was uncoupled and carried forward bodily to be coupled to the other end of the line of hose. This done, the play-pipe had to be attached to complete the race.

All this was done with the regular service hose and carts in the regular manner of everyday fire-fighting; at the end of the race the hose and play-pipe were

ready to throw water. Yet from the word "Go!" to the moment when the winning company coupled on its play-pipe in front of the judges' stand was only 32½ seconds.

This remarkable time—phenomenal for a purely service run under such conditions—speaks well for Salem firemen, and also for the improved couplings adopted some years ago and now used throughout their department. Such speed in such a race would have been out of the question with the old screw couplings so commonly used by fire departments, but the "Quick as Wink" Couplings used in Salem are practically instantaneous, so no time was lost in making the shift of hose and in putting on the play-pipe. Such couplings should furnish fire departments food for some thought.

The Foster Impact Pumping Engine.

When it is desired to deliver water for a town supply to an elevated tank, reservoir or water tower, and there is a fall or incline in the stream from which the supply is taken, the Foster impact pumping engine will be found a sure and economical device.

It is designed to pump water by water power. It has no moving or wearing parts except the valves. It will operate with a power head as low as 18 inches. It will pump water against a head 30 times the power head. It will develop a mechanical efficiency of 80 per cent. It is perfectly automatic, not even requiring lubrication. It will run automatically and give a constant supply, night and day, with practically no cost of operation and a very slight cost of maintenance. The expense of operating a steam plant for two years usually equals the cost of installing the Foster impact plant.

Plants are installed by the Power Specialty Company of New York on the basis of absolute guarantee.

The Atkinson Pick-Up Hand Street Sweeper.

A representative of this magazine has recently observed the operation of the Atkinson Patented "Pick-Up" Hand Street Sweeper, which was described on page 79 of the August number of Municipal Engineering, and was thoroughly satisfied with its work. Upon a dry street with a comparatively soft brush the street dust was taken up thoroughly, even from the rectangular recesses in the surface of the brick gutter of the asphalt pavement on which it was in use, and the amount of dust raised and carried by the wind was almost inappreciable. Used by day on streets swept with large machines by night, it takes the place of several "white wings." The reservoir for sweepings is necessarily small, but is easily dumped and the piles are at convenient distances for the man with team and shovel. With a stiffer brush wet matters which stick to the pavement can be loosened and picked up, but for use on pavements in their usual dry state the softer brush picks up the dirt equally well without raising the dust in clouds. The machine is certainly a boon to the operator, being much easier to run than the broom and scraper and saves considerable expense on account of the rapidity with which he can work, thus reducing the number of men necessary. Properly operated, it does better work than can be done with broom and scraper. A small scraper is carried on the machine for use on droppings wet enough to stick to the pavement, thus providing for every requirement of a machine for such use.

Trade Publications.

The New Era Iron Works Company, Dayton, O., issues two catalogues of its New Era gas and gasoline engines, one describing its horizontal engines, stationary and portables and the other its two and three-cylinder vertical gas engines.

Trade Notes.

ASPHALT.

The location of a plant for manufacturing asphalt paving blocks at Point Edward, Ont., is contemplated.

The Economic Asphalt Street Repair Company, Denver, Col., has been incorporated with $1,200,000 capital.

A reorganization of the Forward Reduction Company of Cleveland, O., which was recently bankrupted, will probably be effected. The company operated under special processes for producing refined oils, asphalts and by-products.

The A. H. White Company, Ltd., of New Orleans has been granted permission to do business in Texas, buying and selling coal tar, asphaltum, etc. The company headquarters will be in Beaumont.

The National Asphalt, Brick and Tile Company of New Jersey has been notified to discontinue business. Failure to pay license fee or tax of 1-10 of 1 per cent. led to the notice.

The Gilson Asphaltum Company of St. Louis, Mo., has filed a copy of its charter and by-laws at Salt Lake City preparatory to doing business in the state of Utah.

All of the plants of the Barber Asphalt Company will be reduced in size, several suppressed and a new concentrating refinery is proposed near Perth Amboy, N. J., according to press reports.

A superior quality of asphalt has been discovered on land on the Cannon Ball river, south of Dickinson, N. D., according to press reports.

ATKINSON HAND PICK-UP SWEEPER.

BRICK.

A vitrified brick plant at Mayfield, Ky., has been purchased by W. S. Cook.

C. R. Marcotte has purchased the patterns and rights of the Port Huron Petrified Brick Company, Port Huron, Mich. A company is being organized to place the plant in operation.

The Georgia Vitrified Brick and Clay Company, Augusta, Ga., has completed its organization and has located a site for its plant. Paving brick, sewer pipe and other fire brick products will be manufactured. The construction of the plant is under the general supervision of H. B. Camp.

CEMENT.

A cement moulding company has been organized at Flint, Wash. R. C. Murray is president.

The Alpha Portland Cement Company., Thomas Prosser & Son, J. B. King & Co. and the Joliet Bridge and Iron Company have filed suit in the circuit court against William and John W. Dickinson and Charles H. McFarland, directors of the Dickinson Cement Company, Chicago, to compel them to pay a proportionate share of the indebtedness of the Dickinson Cement Company in excess of the capital stock said to have been due since June 27, 1901. The amount is alleged to be $85,491. The Dickinson Cement Company is indebted to the Alpha Cement Company alone, it is claimed, $23,343.

The immense plant being built by the Hecla Portland Cement and Coal Company, Bay City, Mich., is nearing completion.

The plant of the Iola Portland Cement Company, Iola, Kas., will be enlarged.

The Elite Portland Cement Company, Louisville, Ky., has been incorporated.

The West Virginia Lime and Cement Company, Louisville, Ky., has been incorporated.

The citizens of Apollo, Armstrong county, Pennsylvania, has subscribed more than $12,000 to secure a cement manufacturing plant.

The D. G. Cutler Company of Duluth, Minn., has been incorporated to buy, sell, manufacture and deal in lime, cement, etc. Dwight G. Cutler, William E. Mayner and Jane T. Cutler of Duluth are the incorporators.

Galbraith, Bacon & Co., Seattle, Wash., have begun the erection of a cement storage warehouse at the corner of Railroad-ave. and Wall-st.

The Lebanon Valley Portland Cement Company, Augusta, Me., has been incorporated with a capital of $600,000.

Edington, Groner & Griffiths, railroad contractors of Knoxville, Tenn., desire to correspond with manufacturers regarding the purchase of several thousand barrels of Portland cement.

The Century Carbonate Company, Burlington, N. J., has been incorporated to manufacture cement, plaster, etc., by Harold B. Ayres, Richard Furst and Franklin C. Woolman.

The Hon. Edward Harvey is president, William R. Yeager treasurer and Aaron Barnes secretary of the Lion Cement Company, which was recently organized at Allentown, Pa. The company's tract consists of 150 acres of rich cement land at Bath, Pa. Committees were appointed to have surveys made and to adopt plans for a plant with a capacity of 2,000 barrels daily. It is proposed to have the plant in operation by April, 1903.

The Michigan Cement, Brick and Moulding company has been organized at Flint, Mich., to manufacture and sell cement building brick.

The Superior Portland Cement Company of Pennsylvania has applied for a charter. W. B. Shafer of Nazareth, Pa., is promoter of the company.

The Moore Cement Company with headquarters in Winnipeg, has been incorporated by Wesley Moore and John Moore of Miami, L. S. Vaugh, O. J. Grain and John Haffner of Selkirk.

W. L. Sperry, Cumberland, Md., is interested in a Portland cement plant which will be erected near that city soon.

The West German Portland Cement Company has been incorporated to build a plant in Lima township, Washtenaw county, Mich. Linus S. Leach and Howard C. Miller of Detroit are interested.

The Hydraulic Cement, Brick and Stone Company of Charleston, S. C., has applied for articles of incorporation. H. F. Tucker, A. F. C. Cramer and R. P. Tucker, all of Charleston, are interested.

The Kingston Construction Company, Atlantic City, N. J., has been incorporated to manufacture and lay cement, concrete, brick and asphalt pavements. H. L. Barland, Braddock, Pa.; J. C. Wolfram and Henry Wolfram of Pittsburg are the incorporators.

LIGHTING.

The Ontario Gas Company, a reorganization of the Ontario Gas and Improvement Company, has been incorporated with principal office at Honeoye, N. Y.

The Consolidated Railway Electric Lighting and Equipment Company has received a contract from the Rock Island railroad to equip all the cars now being constructed by the Pullman Company with its "axle light" system of electric lights and fans.

A patent has been granted J. W. Forster of Lincoln, Ill. on an incandescent electric light bulb. The Forster Company has already been organized and will build a manufacturing plant in Lincoln.

The Rock Island Electric Construction Company, Rock Island, Ill., is about to be reorganized as the Electric Construction and Machinery Company, with branch establishments in Moline and Davenport. W. H. Dickman, J. T. Marron of Rock Island and Herman T. Schmidt of Davenport compose the company.

The Central New York Electric Light and Power Company, Skaneateles, N. Y., has transfered its franchise, etc., and discontinued its business and offers for sale its water power, situated in the outlet of Skaneateles lake, Elbridge, N. Y.

WATER.

The Pittsburg Plate Glass Company have contracted with William B. Scaife

& Sons Company of Pittsburg, Pa., for a 2,500 horse-power, We-Fu-Go water softening and purifying system to be erected at their Elwood, Ind., plant.

This system is to soften and purify well water which contains exceptionally large quantities of scale-forming and corroding substances for use in their boiler plant. All sorts of devices and apparatus have been tried for this purpose without obtaining the desired results. After careful investigation the We-Fu-Go system has been selected.

Among some of the recent contracts closed by William B. Scaife & Sons Company for both the Scaife and We-Fu-Go water softening and purifying systems are the following:

Union Steel Company, Donora, Pa., 500,000 gallons.

Pennsylvania Salt Mfg. Company, Wyandotte, Mich., 150,000 gallons.

The Ogemaw Company, North Bay City, Mich., 1,500 horse-power plant.

The Ogemaw Company, West Branch, Mich., 500 horse-power plant.

The Lancaster Mfg. Company, Clinton, Mass., 1,000,000 gallons.

The Gibson Mfg. Company, Concord, N. C., 100,000 gallons.

MISCELLANEOUS.

The Milwaukee Granite Company has been organized by Charles J. Dixon, Alvah F. Remington and Arthur S. Friend.

The foundation of a new company and the establishment of a central manufacturing plant in Lincoln, Ill., is proposed.

The Syracuse Chilled Plow Company of Syracuse, N. Y., announces an increase in prices of its products on account of the advances in raw materials.

Meixner brothers have purchased the Owatonna Paving Company, Owatonna, Minn. They have had several years of experience in constructing cement walks and curbs.

Recent Inventions.

706,382. Aug. 5, 1902. Road-grading Machine. R. E. Burke, Anderson, Ind., assignor to M. B. Wilson, Chicago, Ill. A machine carrying beneath it a scraper-blade supported by a circle-plate by which it may be turned, and mechanism for elevating the blade.

706,410. Aug. 5, 1902. Mold for Cement or Concrete Curbs. John T. Harrop. Composed of plates provided with fastening devices so adapted that a plurality of separate molds may be connected.

706,619. Aug. 12, 1902. Beam for Railroad Track Foundation. L. B. West, Cincinnati, O. A track beam surrounding sides and bottom of a rail and composed of asphalt and coal tar mixed with sand, crushed stone and like material.

706,662. Aug. 12, 1902. Dump Car. F. S. Ingoldsby, St. Louis, Mo. A dumping door which swings downward and which is adapted to engage tightly with the car side.

706,663. Aug. 12, 1902. Dump Car. F. S. Ingoldsby, St. Louis, Mo. A hinged door carrying a shield and extending over the hinge to make a tight joint when the door is closed

706,671. Aug. 12, 1902. Electric Road-grading Machine. John W. Langfitt, Adel, Ia.

706,807. Aug. 12, 1902. Ditching Jack. C. E. Dixon and J. E. Dixon, Pittsburg, Pa. Combination of shoes having sockets, of a screw carrying a ball associated with one socket, a sleeve having its ends enlarged and carrying a ball engaging the other socket, and a nut engaging the screw.

706,974. Aug. 12, 1902. Conduit for Electric Wires. R. W. Lyle, Perth Amboy, N. J. A hollow conduit, comprising abutting tile sections, the ends being grooved and keyed to bridge the joints between the sections.

707,086. Aug. 19, 1902. Fireproof building. W. Cooley, Minneapolis, Minn., assignor of two-thirds to G. T. Houstain, same city. Walls formed by fireproof blocks with interposed metal bars having their projecting ends embedded in a corner column of cement, metal binder connecting the ends of the bars and angle-iron columns placed at the corners of the adjoining walls.

707,115. Aug. 19, 1902. Combined curb and gutter block. J. R. Jecklin, Newburgh, N. Y. Comprising a body portion having a flange on opposite sides of each end, a projection extending from the center of the face being slightly concaved and with a groove on the upper edge.

707,333. Aug. 19, 1902. Filter. Churchill Hungerford, Philadelphia, Pa. A sand valve for a filter consisting of a plate and a side wall with a port between, part of the plate forming a movable flap adapted to regulate the area of the port.

707,591. Aug. 26, 1902. Underground trolley system. F. A. Howarth, Johnstown, N. Y., assignor of one-half to H. L. Shaver, Colwes, N. Y. A supply conductor, a flexible tubular inclosure, supports for the conductor, and means for supporting the inclosure sections out of contact with the conductor.

707,611. Aug. 26, 1902. Sand screen for well tubes. Cleophas Monjeau, Middletown, O. A "tube point" consisting of a perforated cylindrical core having spirally wound a continuous tubular coil of wire, a binding wire extending through the coil.

707,635. Aug. 26, 1902. Slab or tile for building purposes. Neils Poulson, Brooklyn, N. Y. A core of a composition of earthy and fibrous materials, a grid imbedded, and a surface coating of earthy material and finely comminuted vegetable matter.

707,663. Aug. 26, 1902. Rail bond. M. F. Whiton, Hingham, Mass. Composed of a laminated strip having flat feet and an intermediate extensible portion.

707,688. Aug. 26, 1902. Conveying apparatus. J. W. Fouman, Healdsburg, Cal.

707,825. Aug. 26, 1902. Water gate. D. N. B. Coffin, Newton, Mass, assignor to Coffin Valve Company, Boston, Mass. Combination of two valve disks having seat faces in angular relation to each other and the annular union or ring connection uniting them.

IMPROVEMENT AND CONTRACTING NEWS

PAVING.

Bowling Green, O.—A wide tire ordinance is pending in the council, which provides the following: Loads of 2,000 to 2,500 pounds, 2½-inch tire; 2,500 to 3,500, 3-inch tire; 3,500 to 4,000 pounds, 3½-inch tire; 4,000 to 5,500, 4-inch tire; over 5,000 a 6-inch tire.

Terre Haute, Ind.—The board of public works has prepared estimates for the ensuing year, which include the following: Disposal of garbage, $6,000; city engineer's department, $4,710; public light, $29,300; public parks, $6,000; public sewers, $15,000; public water, $31,800; street intersections, $10,000; street repairs, $2,125.

CONTEMPLATED WORK.

Earlington, Ky.—Paving is contemplated for Bluff-st.

Everett, Wash.—The improvement of Colby-ave. is contemplated.

Peru, Ill.—The Fifth-st. hill will be graded and macadamized.

Washington, Pa.—The building of cement walks is contemplated.

Lead, S. D.—Contracts will be let for grading Main and Mill-sts.

Mexico, Mo.—Brick paving is contemplated for the public square.

Morristown, N. J.—Macadam paving has been decided upon for James-st.

Jerseyville, Ill.—The city council passed an ordinance, Sept. 12, to pave N. State-st

White Lake, S. D.—Cement walks are contemplated for the business streets.

Eureka, Ill.—An ordinance is pending providing for brick sidewalks.

Olympia, Wash.—An ordinance was passed Sept. 15 for building cement walks.

Middleboro, Mass.—Paving is proposed for about ½-mi. of S. Main-st.

Harrisburg, Pa.—An ordinance has been passed for paving numerous streets.

Jacksonville, Fla.—Vitrified brick paving is contemplated for Charlotte-st.

Indianapolis, Ind.—Resolutions have been adopted for brick paving in two alleys.

Warrensburg, Mo.—A resolution has been passed for macadamizing Maguire-st.

San Diego, Cal.—Surveys for twenty-six miles of boulevards have been made by the city engineer.

Youngstown, O.—Resolutions have been passed for building sidewalks on Walker-st.

Alton, Ill.—Paving is proposed for Ridge and Bluff-sts., from State to Main.

Birmingham, Ala.—Paving is contemplated for Third and Fourth-aves. and Nineteenth-st.

Bloomington, Ill.—An ordinance was passed Sept. 19 to pave E. Grove-st. with asphalt.

Hartford, Conn.—Supt. of Streets Hansling has recommended macadam paving for Hazel-st.

Sebring, O.—The Sebring Land Company has decided to build 7,000 ft. of flagstone sidewalks.

Abington, Ill.—A petition for brick sidewalks has been granted. Mayor Shipplett.

Grafton, W. Va.—The paving on Grand, E. Main, W. Main and Washington-sts. will be extended.

Maquoketa, Ia.—The need of brick or asphalt paving is urged by the local press.

Freeport, Ill.—A petition is being circulated for macadamizing West-st. its entire length.

Lancaster, N. Y.—Surveys are being made for establishing road and sidewalk grades.

Murfreesboro, Tenn.—Paving is contemplated for the principal streets. J. H. Crichlow, mayor.

Sharon, Pa.—Ordinances have been adopted for curbing and building sidewalks on several streets.

Seneca Falls, N. Y.—The question of issuing bonds for street paving and sewerage will be voted on.

Pittsfield, Mass.—The question of issuing $100,000 bonds for street paving will be voted on.

Peoria, Ill.—Ordinances are pending for building cement and brick walks in certain streets.

New Brighton, Pa.—An ordinance is pending providing for the paving of Harmony-st.

La Salle, Ill.—Specifications for paving Wright, Seventh and Joliet-sts. have been approved.

Cohoes, N. Y.—A resolution has been passed for paving Congress-st., from Trojan alley to Hort-st.

O'Fallon, Ill.—The town board has authorized the construction of brick paving on Cherry-st.

Montreal, Quebec—McGill-st., in front of the new offices of the Grand Trunk railway, will be paved with asphalt.

West Hartford, Conn.—This town voted Sept. 10 to macadamize Fairview-st. Henry C. Whitman, town clerk.

Shelbyville, Ill.—The cy. coun. took preliminary steps, Sept. 4, toward paving the main street.

Holland, Mich.—About $84,000 will be expended next spring for paving Eighth and River-sts.

Charlottesville, Va.—The question of issuing $80,000 street improvement bonds will be voted on Nov. 4.

Washington, D. C.—The district commissioners have ordered cement and asphalt tile laid in certain streets.

Vincennes, Ind.—Vincennes township has voted to construct a system of gravel roads at a cost of $90,000.

Ft. Worth, Tex.—Asphalt or vitrified brick paving is contemplated for Houston-st. John B. Hawley, cy. engr.

Broadhead, Minn.—The question of macadamizing Center-st. and building brick sidewalks is being discussed.

Grafton, W. Va.—The city council decided, at a special meeting held Sept. 9, to extend the street paving.

Ogden, Utah—A resolution was adopted, Sept. 8, to curb and gutter Twenty-fourth-st., between Grant and Wall-sts.

Buffalo, N. Y.—A resolution was adopted Sept. 14 for paving S. Division-st., from Ellicott to Michigan.

Imboden, Ark.—The town council has passed an ordinance to build six-foot brick sidewalks in all the streets.

Belleville, Ill.—Mayor Hay has asked the county to aid the city in paving the public square with brick.

St. Paul, Minn.—The property-owners on Ninth-st., from Broadway to Smith-ave., are in favor of asphalt paving.

Ft. Dodge, Ia.—Resolutions were adopted Sept. 15 for building sidewalks in the eastern part of the city.

Barberton, O.—Ordinances have been passed for building sidewalks on Tuscarawas and Lake-aves.

Chippewa Falls, Wis.—Specifications for paving Bridges-st. with brick at a cost of $50,634 are being considered.

Great Falls, Mont.—It is proposed to grade and boulevard Eighth-ave. and N. Second-ave. C. W. Swearingen, cy. engr.

San Francisco, Cal.—The bd. of pub. wks. decided Sept. 6 to pave H-st., between Frederick-st. and Seventh-ave.

Bluffton, Ind.—The bids for paving Cherry-st. with asphalt were rejected and the work will be readvertised.

Alliance, O.—Resolutions were adopted Sept. 15 for building new brick walks on Ely-st. and Mechanic alley.

Bowling Green, O.—Resolutions were passed Sept. 15 for building sidewalks in a large number of streets

Danville, Ill.—The question of paving E. Madison, Jackson and E. North-sts. and Washington-ave. is being considered.

Ft. Dodge, Ia.—The city clerk has been directed to ask for bids for brick walks to be built during the year.

Nashville, Tenn.—A bill has been passed appropriating $25,000 for paving Russell-st. with bituminous macadam.

Springfield, Mo.—A resolution was adopted Sept. 18 for repaving Boonville-st., from the public square to the bridge

New Orleans, La.—Ordinances have been adopted for asphalt paving on St. Charles-st., Homer-ave., Bourbon and Toulouse-sts.

Crookston, Minn.—A petition is being circulated asking the council to pave the business streets with macadam.

Deadwood, S. D.—Resolutions have been passed for building sidewalks on Washington and Pine-sts. Mayor McDonald.

Mauch Chunk, Pa.—An ordinance has been adopted to pave the street between the courthouse and the jail.

Spokane, Wash.—Plans and specifications have been prepared for asphalt walks on Eleventh-ave., from Monroe to Adams-st

Clinton, Mo.—The business men remonstrated Sept. 16 against the proposed macadam repairing and the matter has been deferred.

Monmouth, Ill.—An ordinance has been passed for building a permanent sidewalk on the sides of the new Garfield school building.

Little Rock, Ark.—The estimated cost of grading and macadamizing the proposed new drive to Ft. Logan H. Roots is about $3,000.

Cleveland, O.—It is estimated that about 29 mis. of paving will be constructed next year of which 26.7 mis. will be of brick.

Carthage, Ill.—An ordinance has been passed for paving the streets on the public square and to the C., B. & Q. depot.

Bushnell, Ill.—An ordinance has been passed for paving the street running east from the First National bank to the park.

Lexington, Md.—An ordinance was passed Sept. 16 to pave Main-st. from Turner hall to Fifteenth-st. with vitrified brick.

Ft. Wayne, Ind.—The city engineer has been directed to make plans for sidewalks on Lafayette-st., from Toledo to Virginia.

San Francisco, Cal.—Cy. Engr. Grunsky estimates the cost of paving the central portion of Steep-st. with basalt blocks at $100,000.

Joliet, Ill.—The property-owners on Van Buren-st. between Chicago and Ottawa, have petitioned for asphalt paving. Mayor Barr.

Cincinnati, O.—The property-owners on Imperial-st., between St. Clair and Nixon-sts., have petitioned for cement walks.

Evanston, Ill.—The property-owners on Grant-st., between W. Railroad and Darrow-aves., have petitioned for cement walks. Mayor Patten.

Newport News, Va.—City Engineer Pearse has been directed to make plans and specifications for paving West-ave. and Twenty-sixth-st.

White Lake, S. D.—The town council has ordered the grading of the main business street and the construction of cement walks.

Peru, Ill.—The mayor and city clerk have been directed to ask for bids for a sidewalk on Fifth-st., between Gooding and Wright.

Norwich N. Y.—A petition has been filed with the village trustees for paving Birdsall-st. with macadam from E. Main to Clinton.

Fond du Lac, Wis.—The business men are discussing the merits of asphalt and brick paving for Main-st. from Davidson-st. to Forest-ave.

Mankato, Minn.—The special committee has recommended that Eagle lake road be macadamized from Eagle lake hill to the city limits.

Harvey, Ill.—The contract for improving Park-ave. from One Hundred and Fifty-fifth-st. to One Hundred and Sixty-first-st with crushed stone has been awarded to Bloodgood & Davidson of this city at $7.50 a rod.

La Salle, Ill.—Specifications have been submitted for paving Wright and Joliet-sts. with brick. S. J. Noonan, cy. engr.

Santa Barbara, Cal.—A resolution was passed ordering all the sidewalks on Chapala-st. paved with asphaltum or concrete.

Middletown, N. Y.—A resolution has been adopted providing for vitrified brick paving on North-st. from Franklin-square to the Erie crossing.

Niagara Falls, N. Y.—The board of public works has been directed to ascertain the cost of paving Walnut-st. from Main-st. to the overhead crossing.

Mobile, Ala.—Brick paving on concrete is contemplated for Water and Royal-sts.; Belgian block on concrete for Commerce-st.; asphalt on concrete for Government-st.

Michigan City, Ind.—Resolutions have been passed for building cement sidewalks in E. Eighth, Franklin, Pine, Boston, Cedar, Sixth and Spring-sts.

Louisville, Ky.—The board of public works was authorized Sept. 23 to ask at once for bids for building granitoid sidewalks on Fourth-ave from Broadway to Magnolia-ave.

Burlington, Ia.—An ordinance has been approved for paving Sixth, Valley and Barnes-sts. with vitrified brick. H. G. Marquardt, mayor; F. P. Badger, cy. clk.

Oakland, Cal.—Specifications have been filed for macadamizing a portion of Redwood road. The residents on Linde-st. in Fruitvale have petitioned for macadam paving.

Jamestown, N. Y.—A petition is being circulated asking that Pine-st. from Second to Main-st. be paved. Some of the property-owners prefer other paving than brick.

Manhattan, Kas.—An ordinance was adopted Sept. 16 for building a virtified brick sidewalk on Ninth-st. from Houston to Leavenworth-st. Mayor Miller, H. W. Hungerford, cy. clk.

Syracuse, N. Y.—Plans for paving N. Warren-st. from James to W. Willow-st. and on Willow from the Oswego canal to N. Salina-st. with asphalt have been approved.

Plainfield, N. Y.—The Somerset county board of freeholders recommended Sept. 9 that the county be bonded for $300,000 for the construction of state macadam roads.

Little Falls, Minn.—An ordinance was passed Sept. 9 providing that the council refund 25 cts. a sq. yd. to parties constructing cement or other permanent sidewalks.

Chippewa Falls, Wis.—The estimated cost of paving Bridge-st. from Spruce-st. south with vitrified brick is $41,641 on gravel foundation and $50,634 on macadam foundation.

Dixon, Ill.—The property-owners on Madison-ave. from First-st. to the switch track and on Fourth-st. from Van Buren-st. to Lincoln-ave., have petitioned for cement walks. Mayor Truman.

Baltimore, Md.—A petition is being circulated by the S. E. Baltimore Improvement association requesting the city council to act favorably on an ordinance for paving O'Donnell-st. from Boston-st. to East-ave.

Allegheny, Pa.—Ordinances were passed Sept. 16 authorizing the grading, paving and curbing of Simpson and Iowa-sts. and Arthur-ave., regrading and paving Marion-ave. and Monterey-st.

Glenwood, Ia.—An ordinance has been passed requiring the construction of brick stone or cement walks around the square and for one block leading in each direction from the square.

Peoria, Ill.—The board of local improvements has called a public conference for Sept. 30 to consider the paving of Fourth-st. from Elizabeth to Park-st. The city surveyor is securing estimates, etc., on asphalt paving.

Pasadena, Cal.—A resolution was passed Sept. 2, to grade and gravel the roadway and construct cement walks, curbing and gutters on Seventh-st. from Market-st. to Rubideux boulevard. C. R. Stibbens, cy. clk.

Milwaukee, Wis.—The board of local improvements decided Sept. 11 to not let the contract for paving Mt. Vernon-ave., on account of the bids for the macadam being too high. The bids ranged from 43 to 48 cts. a sq. ft.

Omaha, Neb.—An ordinance was passed Sept. 10 for paving Manderson-st from Twenty-fourth to Twenty-seventh. Ordinances are pending for paving Twenty-first-st., from Spencer to Pickney, and Seventeenth-st. from Harney to Jackson, with vitrified brick.

Columbus, O.—An ordinance was approved by the mayor Sept. 16 for paving Rinehart-ave. from Mohawk to Jaeger-st. and Jefferson-ave. from Leonard to the P., C., C. & St. L. Ry., with asphalt, brick or vitrified block. J. T. Barr, cy. clk.

Freehold, N. J.—The board of chosen freeholders passed a resolution Sept. 10 appointing a committee to direct the preparation of the necessary maps, plans, specifications, etc., for improving the Freehold and Manalapan road, 5½ mis.

Cedar Rapids, Ia.—Resolutions were passed Sept. 16 for paving as follows: Macadam, First-ave., from Twentieth-st. to C., M. & St. P. Ry., Sixteenth-ave., from Sixteenth-ave. bridge to A or Walnut-st.; brick paving Tenth-st. and Mt. Vernon-ave. Charles D. Huston, mayor.

Nashville, Tenn.—Bills passed second reading Sept. 23 appropriating $3,700 for paving the westerly approach of Cumberland river bridge with granite; $5,000 to pave Market-st. from Church to Union with granite; $2,700 to pave Cedar-st. with macadam from Cherry to Park.

CONTRACTS TO BE LET.

Newark, O.—Bids are asked until Oct. 13 for paving Elm-st. with brick. F. T. Maurath, cy. clk.

Marion, Ind.—Sealed bids are asked until 7 p. m. Oct. 21 for improving an alley. C. G. Robbins, cy. clk.

Topeka, Kas.—Bids are asked until Oct. 3 for building a macadam road. S. H. Haynes, chmn. co. comrs.

Newton, N. J.—Sealed bids are asked until Oct. 20 for building four miles of macadam road. A. H. Konkle, engr.

Noblesville, Ind.—Bids are asked until 7:30 p. m. Oct. 6 for grading and graveling Logan-st. and curbing with stone. Cy. clk.

Burlington, Ia.—Bids are asked until Oct. 6 for paving Main-st., from Smith to Wade, with brick. Emmet Steece, cy. engr.

Des Moines, Ia.—Bids are asked until Oct. 6 for 49,700 sq. yds. of asphalt paving on various streets. J. E. Stout, chmn. B. P. W.

Grand Forks, N. D.—Sealed bids are asked until 10 a. m. Oct. 6 for grading sections of a roadway. Thos. L. Lawson, co. surveyor.

Pittsburg, Pa.—Sealed bids are asked until Oct. 4 for the permanent improvement of certain public highways. W. E. Thompson, co. comptroller.

Jefferson Barracks, Mo.—Bids are asked until Oct. 6 for constructing roads and granitoid walks. Capt. W. C. R. Colquhoun, acting depot Q. M.

Cedar Rapids, Ia.—Sealed bids are asked until 2 p. m. Oct. 3 for paving Tenth-st. and Mt. Vernon road with brick blocks. W. L. Cherry, chmn. pub. impvts.

Des Moines, Ia.—Sealed bids are asked until 11 a. m. Oct. 3 for curbing E. Second and Des Moines-sts. with Portland cement. J. E. Stout, B. O. Hanger, B. P. W.

Dayton, O.—Sealed bids are asked until 12 m. Oct. 3 for grading and graveling Leonhard-ave., from Troy-st. to the Dayton & Michigan railroad. J. E. Gimperling, prest. B. C. A.

Paulding, O.—Sealed bids are asked until 12 m. Oct. 8 for grading, tiling, stone and top-dressing Musselman, Reeb, Hubbard & Windeville pikes. Oliver Morrow, engineer.

Columbus, Ind.—Sealed bids are asked until 11 a. m. Oct. 6 for building three miles and 549 feet of free gravel roads in Wayne twp. Jesse H. Day, chmn. co. comrs.; Saml. W. Fitch, co. audt.

Mare Island, Cal.—Bids are asked until Oct. 11 for building 80,000 sq. ft. of asphalt pavement at the navy yard. M. T. Endicott, ch. bureau yards and docks. Navy Department, Washington, D. C.

Rushville, Ind.—Sealed bids are asked until Oct. 10 for graveling a street 1,500 ft. long, building one block of cement walks and 5,000 lin. ft. of stone curb and cement gutters. A. L. Stewart, cy. engr.

Toledo, O.—Sealed bids are asked until Oct. 6 for paving Twenty-second-st. from Norwood-ave. to Monroe-st. with asphalt, asphalt blocks, vitrified brick or blocks or kreodone creosoted blocks. Bids will be received until Oct. 20 for paving Federal and Clark-sts. with asphalt blocks or vitrified blocks. Chas. H. Nauts, cy clk.

Indianapolis, Ind.—Sealed bids are asked until 10 a. m., Oct. 3 and 8, for paving with cement the sidewalks of Senate-ave. from Thirty-second-st. to Thirty-third-st.; Meridian-st. from Thirty-fourth to Thirty-eighth-st.; Washington-st. from Maple-ave. to Central-ave.; Central-ave., from Washington-st. to Lowell-ave.; Lowell-ave., from Maple to Central-ave.; Harrison-st., from English-ave. to Noble-st.; Wilcox-st., from Belmont-ave. to Lynn-st. Harold C. Megrew, chmn. B. P. W.

from Maple to Central-ave.; Harrison-st. from English-ave. to Noble-st.; Wilcox-st. from Belmont-ave. to Lynn-st. Harold C. Megrew, chmn. B. P. W.

CONTRACTS AWARDED.

Clayton, Conn.—C. B. Cadwell has been awarded the contract for 5,140 ft. of highway work.

Evanston, Ill.—The contract for building cement sidewalks has been awarded to Voight & Gaus.

Tuscola, Ill.—The contract for street paving was awarded to Morris & Porter of Paris for $40,000.

St. Louis, Mo.—The Southern Paving and Construction Company was awarded the contract for grading for $8,450.

East Liverpool, Ia.—The contract for paving Spring Hill-ave. was awarded to Rinehart Bros. for $8,000.

Pekin, Ill.—The contract for grading E. Bluff road was awarded to Wolf, Maupin & Curdie of Altoona, Ill.

Muskegon, Mich.—The Barber Asphalt Paving Company was awarded the contract Sept. 4 for paving Muskegon-ave.

Sharon, Pa.—The contract for paving Chestnut-st. was awarded to James L. Rose & Son at $1.52 a sq. yd.

Berlin, Conn.—The contract for macadamizing Clayton road has been awarded to C. B. Cadwell for $2,450.

Kenton, O.—The contract for macadamizing S. Detroit-st. has been awarded to O. M. Detrich for $14,547.

Passaic, N. J.—Ed Dowling secured the contract for macadamizing a part of the River road for $1,400.

Groton, Conn.—M. A. Zaccardy has been awarded the contract for 5,414 ft. of macadam roadway for $5,200.

Helena, Mont.—Louis Johnson was awarded the contract for grading and curbing Breckinridge-st. for $3,450.

Blissfield, Mich.—The contract for paving Adrian-st. with brick has been awarded to Garrigan Bros. of Toledo.

Middleton, Conn.—The contract for 2,300 ft. of grading has been awarded to McDonald & Hennessey for $2,100.

Chicago, Ill.—The Barber Asphalt Paving Company has been awarded a contract for asphalting 3 blocks for $22,000.

Janesville, Wis.—The contract for macadamizing various streets has been awarded to Brown & Connors for $15,222.

Denver, Col.—The Western Realty and Paving Company has been awarded the contract for paving S. Fourteenth-st. for $20,904.71.

Green Bay, Wis.—The contract for paving Broadway-st. with macadam has been awarded to J. K. Delaney for $7,000.

Grosse Pointe, Mich.—H. F. Liphardt submitted the lowest bid Sept. 15 for paving Jefferson-ave., at $19,000.

Ensley, Ala.—The contract for macadamizing Avenue E from Twenty-second to Twenty-eighth-sts. was awarded Sept. 4 to J. D. Moore & Co.

Pasadena, Cal.—The contract for building cement sidewalks on Grant-st., from Marengo to Euclid-aves., was awarded.

Sept. 9, to E. H. Smith as follows: Sidewalks, 10 cts. a sq. ft.; grading, 30 cts. a cu. yd.; curbing, 27 cts. a lin. ft.; gutters, 4.1 cts. a sq. ft.

Portland, Or.—The contract for paving Seventh-st. with asphalt has been awarded to the Trinidad Asphalt Company for $32,716.

Waltham, Mass.—The contract for constructing the Quincy-st. extension has been awarded to W. H. Mague, Newton, for $7,737.

Leavenworth, O.—Chapin & Greeve secured the contract Sept. 12 for 19,063 sq. yds. of brick on Fourth at $1.469 a sq. yd.

Los Angeles, Cal.—The contract for grading, curbing and graveling Millard-ave. was awarded to M. S. Cummings for $6,484.38.

St. Joseph, Mo.—Fred Roth secured the contracts for macadamizing in Fifteeth and Franklin-sts. and Dewey and St. Joseph-aves.

Tuscola, Ill.—The contract for paving a number of streets has been awarded to Morrissey & Porter of Paris, Ill.

Ashburnham, Mass.—The contract for 1,200 feet of highway work has been awarded to Charles H. Gates at 84 cents a running foot.

Boston, Mass.—The contract for paving Oakland-st., Mattapan, with Telford macadam has been awarded to Thomas J. Walsh for $15,815.

Canton, O.—John B. Snyder secured contracts Sept. 10 for paving a number of streets with Hipp paving brick at $1.14 a sq. yd.

Jerseyville, Ill.—The contract for paving S. Main-st. has been awarded to Wolfe, Maupin & Cuddie of Alton at $1.49 a sq. yd.

Springfield, Mo.—The contract for paving Springfield-ave. and Main-st. was awarded Sept. 18 to E. A. Barber for $5,081 and $2,500, respectively.

Chicago, Ill.—The R. F. Conway Company was awarded the contract Sept. 12 for paving W. Lake-st., from Fortieth to Forty-eighth-aves., with granite.

East Washington, Pa.—The contract for paving Aylesworth-ave., Fifth-st. and Sherman-ave. was awarded Sept. 16 to R. T. Hallam & Sons.

Youngstown, O.—The Cleveland Trinidad Paving Company has been awarded the contract for paving Holmes-st. with asphalt at $1.99 a sq. yd.

San Francisco, Cal.—The contract for repaving Bryant-st., between Main and Beale, was awarded to the City Street Improvement Company for $1,687.

Flora, Ill.—The contract for paving St. James-st. was awarded Sept. 17 to Thompson & Case for $16,940.72.

Decatur, Ill.—The contract for paving W. Main-st. has been awarded to the Parks Company of Louisville, Ky., according to press reports.

Niagara Falls, Ont.—The contract for paving a large number of streets was awarded Sept. 15 to the Crescent Paving Company of Buffalo, N. Y.

New York City.—Bids for building sidewalks around Tombs prison were received from the P. J. Carlin Company, $12,000, and J. R. Sheehan & Co., $14,500.

Ilion, N. Y.—The contract for paving Union and First-sts. with brick was awarded Sept. 10 to W. T. O'Connor of Syracuse for $7,246.30.

Vicksburg, Miss.—Nicholson & Williams were awarded the contract for grading the 2d and 3d sections of Confederate-ave., in the Vicksburg Military park.

Kansas City, Kas.—The contract for paving Ferry-st. and Splitlog-ave. with brick was awarded Sept. 9 to the R. J. Boyd Construction Company at $1.40 a sq. yd.

Milwaukee, Wis.—James O'Donnell has been awarded contracts for brick paving in an alley at $2.74½ a sq. yd. and in Canal-st. at $2.23½ a sq. yd.

Dayton, O.—The contract for paving Main-st., from Fair Ground-ave. to Stewart-st., and from Stewart-st. to L-st., was awarded Sept. 10 to Joseph E. Conley.

Hamilton, O.—The Ayres Asphalt Paving Company, Zanesville, O., submitted the lowest bid Sept. 6 for paving E. High-st. with asphalt, the total of which is $36,611.

Detroit, Mich.—J. Porath submitted the lowest bid Sept. 22 for paving Lawton and Wabash-aves. with cedar on concrete at $3,372.90 and $12,219.32 respectively.

South Bend, Ind.—Brick paving contracts have been awarded as follows: Division-st., to Roberts, Hoban & Roach, $32,904; Monroe-st., to Defrees & Beyrer, $1,819.

Crawfordsville, Ind.—The contract for a cement walk on Plum-st., from Wabash-ave. to Main-st., was awarded Sept. 15 to Nolan & Slattery at 12 cts. a sq. ft.

Kensington, Md.—The contract for building 5,000 sq. ft. of brick sidewalks has been awarded to the Colburn Paving Company of Washington at 79 cts. a sq. yd.

Bloomfield, Ind.—Contracts for 14.8 mis. of macadam roads in Richland township have been awarded to George M. Notter of Worthington, Ind., and Vest & Quillen of Bloomfield.

Mobile, Ala.—The Southern Construction Company of Chattanooga, Tenn., was awarded the contract Sept. 7 for brick paving for $39,908.29, and for asphalt paving for $75,054.50.

Syracuse, N. Y.—The Syracuse Improvement Company was awarded the contract Sept. 5 for repairing the asphalt pavement in W. Genesee-st., from N. Salina to N. West-sts., for $8,377.10.

Massillon, O.—The contract for grading and graveling Henry-st., from Fremont to Green, was awarded to Henry Weible at 20 cts. a sq. yd. for grading and 35 cts. for graveling.

Des Moines, Ia.—The Barber Asphalt Paving Company was awarded contracts, Sept. 8, for 52,000 sq. yds. of asphalt paving in E. Walnut, E. Twelfth, E. Fifth and Maple-sts. at $2 a sq. yd.

Chicago, Ill.—The Citizens' Construction Company was awarded the contract, Sept. 22, for paving S. Canal-st., from W. Harrison-st. to the C., B. & Q. railroad on Lumber-st. with granite blocks.

Milwaukee, Wis.—James O'Donnell was awarded the contract for paving the alley, block 169, Fourth ward, for $1,338, and

for 850 sq. yds. of paving on Canal-st. at $2.23½ a sq. yd.

Ft. Wayne, Ind.—Bids were received Sept. 18 for paving Rockhill-st. as follows: C. E. Moellering & Co., metropolitan brick, $2.95 a sq. yd.; Barber Asphalt Paving Company, asphalt, $1.55 a sq. yd.

Troy, N. Y.—The contract for paving Second-ave. and Twenty-sixth-sts. with Johnsonburg brick has been awarded to the T. H. Dumary Company of Albany at $2.17 a sq. yd. on a six-inch foundation and $2.23 on a nine-inch foundation.

New York City—The Uvalde Asphalt Company was awarded the contract, Sept. 4, for work on the Grand boulevard and Concourse from E. 161st-st. to Mosholu Parkway, boro of Bronx, for $1,011,323. The bids were submitted Aug. 20.

Massillon, O.—John B. Snyder of this city was awarded the contract, Sept. 10, for about 17,000 sq. yds. of brick paving at 78 cents a sq. yd.; 36 cents for labor, 40 cents a lineal foot for new curb; 20 cents for old curb.

Marshalltown, Ia.—The Barber Asphalt Paving Company has been awarded contracts for asphalt paving as follows: S. Third-ave., $1.80 a sq. yd.; curbing, 42 cents a lin. ft.; Jerome-st., $1.97 a sq. yd.; curbing, 65 cents a lin. ft.

Indianapolis, Ind.—Bids were received Sept. 10 for resurfacing a portion of Massachusetts-ave. with asphalt as follows: Western Construction Company, $5.36 a lin. ft., or $23,187; Marion County Construction Company, $4.24, or $18,342.

Moline, Ill.—The contract for paving Fifth-ave., from Twelfth to Eleventh-sts., and Eleventh-st., from Fourth to Fifth-aves., with asphalt, was awarded, Sept. 12, to the Barber Asphalt Paving Company for $10,984.75 and $2,869.40 respectively.

South Bend, Ind.—Paving contracts were awarded Sept. 23 as follows: Paving City Hall alley with bituminous macadam, Barber Asphalt Paving Company; cement walks on Notre Dame, Highland, S. Lafayette-st. and South Bend-ave. John W. Donahue; cement walks on Indiana-ave., T. C. Barcus & Son; grading Penn.-ave., H. N. Barnes.

Hamden, Conn.—The contract for macadamizing a section of highway has been awarded to H. S. Jackson of New Haven at 18 cts. a lin. ft. for the Whitney-ave. section and 23½ cts. a lin. ft. for the Dixwell section. Charles W. Blukeales & Sons was awarded the contract for macadamizing Dixwell-ave. at $1.34 a lin. ft.

Indianapolis, Ind.—Bids were received Sept. 22 for resurfacing Virginia-ave. and paving Nineteenth-st. with asphalt as follows: Virginia-ave., Western Const. Company, ranging from $2.90 to $3.70 a lin. ft.; Marion Const. Company, $3.83; Barber Asphalt Paving Company, $3.88½. Nineteenth-st., Western Const. Company, $2.90 to $3.75; Barber Asphalt Paving Company, $4.09; Marion County Const. Company, $4.33.

New York City—President Cantor of the boro of Manhattan returned unopened Sept. 11 the bids for asphalt block paving on Seventh-ave. and other streets. The restrictive clause in the specifications requiring the bidder to deposit a sample of bituminous macadam pavement from a street laid by him and in successful use for at least one year, led to his action. Comptroller Grant said that this was an illegal restriction limiting competition. The board of estimate and appointment will be asked to modify the advertisement.

Spokane, Wash.—The Barber Asphalt Paving Company has been awarded the contract for paving Main-ave. with asphalt as follows: $7.85 cts. a cu. yd.; wearing surface, 98 cts. a cu. yd.; asphalt binder, 40 cts. a sq. yd.; brick gutters, $3.10 a sq. yd.; granite curbs, 45 cts. lin. ft.; general exca., 60 cts. a cu. yd.; sewer exca., 80 cts. a cu. yd.; cement mortar, $19.40 a cu. yd.; catch basins, $27.50 each; surface inlets, $15 each; curb inlets, $17.50 each; 8-in. pipe, 60 cts. a lin. ft.; 10-in. pipe, 80 cts.; sewer pipe bends, 10-in., $1 each; total, $67,333; maintenance for ten years, $6,700.

Bessemer, Ala.—(Special.)—The contract for grading, curbing and paving the sidewalks with chert has been awarded to D. W. Houston of this city as follows: 13,320 lin. ft. straight 5-in. granite curb, 34 cts. lin ft.; 294 ft. curved 5-in. granite curb, 12-ft. radius, 45 cts.; 51 ft. 5-in granite curb, 2-ft. radius,, 45 cts.; 3,400 cu. yds. exca., 20 cts.; 2,150 cu. yds. chert, 64 cts.; 6-in. cross-drains, $2 each. The other bids were as follows: Lucien Huey & Co., city, straight curb, 35 cts.; curved, 40 and 35 cts.; exca., 20 cts., chert, 74 cts.; cross-drains, $1. C. M. Burkhatter & Co., Birmingham, straight curb, 36½ cts.; curved curb, 40 cts.; exca., 17½ cts.; chert, 57½ cts.; cross-drains, 75 cts.

Memphis, Tenn.—Bids were submitted Aug. 29 for paving fourteen streets with asphalt as follows: Memphis Asphalt and Paving Company, $1.24 a sq. yd., with five years and $1.48 with ten years' maintenance; Parker Washington Company, St. Louis, Trinidad refined asphalt, $1.45 with five years and $1.49 with ten years' maintenance; Southern Paving and Construction Company of Chattanooga, $1.26 with five years and $1.49 with ten years' maintenance for Bermundez lake and $1.26 with five years and $1.49 with then years' maintenance for Trinidad asphalt; R. B. Parks Company, Louisville, Ky., Kentucky rock asphalt, $1.15 with five years' maintenance; Louisiana Improvement Company, New Orleans, Trinidad Asphalt, $2, $2.50, $2.75; C. P. White, Boonville, Ind., rock asphalt, class A, $1.16 with five years and $1.19 with ten years' maintenance, class B, $1.05 and $1.08. The bids of the Louisiana Improvement Company and C. P. White were not according to the city's specifications, but under their own specifications.

Buffalo, N. Y.—Bids were opened Sept. 19 for paving Kingston-place and Riverside-ave. The bids were as follows: Kingston-place—German Rock Asphalt and Cement Company, asphalt on concrete, $3,966; asphalt on macadam, $4,700; brick on concrete, $4,100; brick on macadam, $4,712. L. H. Gipp, round edge brick, $4,550; square edge brick, $4,000. H. P. Burgard, asphalt, $5.10; brick, $5,200.

John Mumm, brick, $8,900. Eastern Construction Company, asphalt rock, $3,950. Barber Asphalt Paving Company, asphalt, $3,846. Frank V. E. Bradol, brick, $3,750. Riverside-ave.—H. P. Burgard, asphalt, $11,750; brick, $12,000. John Mumm, brick, $11,450. Barber Asphalt Paving Company, asphalt, $8,597. German Rock Asphalt and Cement Company, asphalt on concrete, $8,387; asphalt on macadam, $10,346; brick on concrete, $9,474; brick on macadam, $10,877. Eastern Construction Company, asphalt rock, $9,100. L. H. Guppe, round edge brick, $9,785; square edge brick, $9,700. Frank V. E. Bardol, brick, $9,000.

SEWERS.

Chicago, Ill.—The use of cement in the construction of intercepting sewers is contemplated by F. W. Blocki, comr. of public works, according to press reports.

Newark, N. J.—Representatives for Orange, Montclair, Bloomfield, Glen Ridge, Nutley, East Orange, township of Union, borough of Watlingtown, Bergen county, and township of Aquachaponk, Passaic county, appeared before the Passaic valley sewerage commission Sept. 17 and formally approved the report of Rudolph Hering for constructing a trunk sewer from Paterson to the bay.

Pueblo, Col.—Judge Voorhees of the district court discussed the injunction proceedings against the city council Sept. 15 prohibiting its letting the contract for the proposed storm and sanitary sewerage system. The proceedings were brought by citizens to restrain the council and Acting Mayor Rizen from letting the contract at what they considered an exorbitant price. The court decided that the council had the right to let the contract.

CONTEMPLATED WORK.

Wyoming, O.—A sewerage system is contemplated.

Newton, Ia.—The citizens have petitioned for two sewers.

Rochester, Minn.—A sewer will be built on the East Side next spring.

Amherst, Mass.—The question of sewage disposal is being considered.

Kaukauna, Wis.—An addition to the sewerage system in the Second ward is contemplated.

Ashton, S. D.—The question of building a drainage system is being agitated.

South Hadley Falls, Mass.—The question of sewerage is being considered.

Muncie, Ind.—A sewer in Wallard-st. is contemplated. F. W. Clevenger, cy. clk.

Toronto, Ont.—A separate sewerage system for the East End has been recommended.

Spokane, Wash.—The extension of the city sewer to the Lincoln sewer is proposed.

Schenectady, N. Y.—The construction of a number of new sewers has been authorized.

Paterson, N. J.—Plans are being devised for installing sewerage systems in the parks.

Polo, Ill.—Plans for about 6 mls. of sewers will be prepared by Jno. W. Alvord of Chicago.

Council Bluffs, Ia.—A resolution has been adopted for sewers in E. Pierce and Williams-sts.

Casselton, N. D.—Plans for about 2,000 ft. of pipe sewers have been submitted to the council.

Edgerton, Wis.—Surveys for a sewerage system are being made by Edw. Ruger of Janesville, Wis.

Lancaster, N. Y.—Surveys have been made preparatory to building a sewerage and drainage system.

Westfield, Mass.—The plans for the south section of the surface drainage system are about completed.

Cincinnati, O.—An ordinance was passed Sept. 10 for building a trunk sewer in Linwood-ave.

Black River, N. Y.—Plans are being prepared for sewers and water works. B. N. Scott, vil. prest.

Solvay, N. Y.—The village voted, Sept. 15, to expend $2,000 for building the Draper tract sewer.

Lansing, Mich.—The construction of a sewer 12,255 ft. in length is proposed. H. A. Collar, cy. engr.

Bessemer, Ala.—(Special.)—William J. Parks, cy. engr., says that the city council is considering the question of building additional storm sewers in the Second-ave. dist. at a cost of $6,000.

The question of issuing bonds for sewerage systems will be voted on as follows: Massena, N. Y.; Seneca Falls, N. Y.; Ligonier, Pa.; Mayfield, Ky.; Lexington, Ky.; York, Pa.

Monmouth, Ill.—An ordinance was passed Sept. 15 for building 1,367 ft. of 13-in. sewer in S. D-st.

Sherman, Tex.—Bonds to the amount of $50,000 for sewer and water extensions will be sold Oct. 6.

Victoria, Tex.—The water works committee was directed Sept. 15 to secure estimates for a sewerage system.

Zanesville, O.—A resolution was passed Sept. 18 to build a sewer in Beech alley. Chas. W. McShane, cy. clk.

Richmond, Ind.—The cy. engr. has been directed to make plans and specifications for a storm sewer in N. Sixth-st.

Bucyrus, O.—Sewers are contemplated in E. and W. Warren, S. Walnut, East and Rogers-sts. W. H. Sams, cy. clk.

New Albany, Ind.—Preliminary plans for the proposed sewerage system will be made by Chas. C. Brown of Indianapolis.

Lexington, Ky.—The question of issuing $125,000 bonds for a new sewerage system will be voted on in November.

Ft. Dodge, Ia.—A resolution has been passed for building storm sewers in certain streets and alleys. D. A. Weller, cy. clk.

Dayton, O.—Bids will be asked at once for building storm water sewers on Franklin, Herbert and Oliver-sts. and Salem-ave.

Baker City, Or.—Bids for the proposed sewerage system will probably be asked in January. W. H. Bentley, cy. clk.

Cleveland, O.—Ordinances have been passed for building sewers in a number of street. Chas. W. Toland, cy. clk.

Bloomington, Ill.—Ordinances were passed Sept. 19 for building several sewers in the eastern part of the city.

Girard, O.—The council is asking for plans and specifications for a sewerage system and disposal plant. E. L. Hausen, cy. clk.

East Washington, Pa.—Boro. Engr. McAdam has been instructed to prepare plans for 5,000 ft. of sewer to complete the system.

East Greensburg, Pa.—An ordinance authorizing the construction of a public sewer has been passed. H. F. Seanor, Ch. Burgess.

Winchester, Mass.—The question of surface drainage for the Church and Lloyd-sts. district is being discussed by the selectmen.

The question of issuing sewerage bonds has been favorably voted on at the following places: Two Rivers, Wis.; Orion, Mich.

Bayonne, N. Y.—Plans and specifications for sewers in E. Sixteenth-st., W. Seventeenth and W. Forty-third-sts. will be made by the cy. engr.

McKeesport, Pa.—Ordinances for sewers in Pope alley, Butler-st., "A" alley, Douglas, Sinclair and Jerome-sts. and Crooked run have been passed.

Springfield, O.—A resolution has been adopted for building a main sewer in Washington and Yellow Springs-sts. R. N. Lantz, cy. clk.

Birmingham, Ala.—The survey for the Valley Creek branch of the Jefferson county trunk sewer has been completed and bids will be asked soon.

Chicago, Ill.—A resolution will probably be introduced proposing that the Lawrence-ave. sewer be built of concrete instead of brick.

Weehawken, N. Y.—The twp. com. has been considering an ordinance for sewage disposal works and an outlet sewer for the southern section of this place.

Clay Center, Kas.—The city clerk has been directed to correspond with some competent engineer to ascertain the expense of surveying sewer dist. No. 1.

Hartford, Conn.—A sewer system in Franklin-ave., a relief sewer from South Meadows and sewers in various streets and avenues are recommended by Cy. Engr. Ford.

Atlanta, Ga.—Mayor Mims has recommended an issue of $400,000 bonds for the improvement of the sewerage system by extending the various trunk sewers to the city limits.

Columbus, O.—Plans are being completed for the west and south side sewer sections of the main trunk system and of the central relief sections. Julian Griggs, cy. engr.

Haddonfield, N. J.—Plans for an egg-shaped brick culvert, with terra cotta connections on Main-st., have been approved and bids will be opened Oct. 1. J. Lewis Rowand, boro engr.

Bloomington, Ill.—The sum of $100,000 will be expended soon for a new drainage ditch and the improvement of the ditch built about eighteen years ago in Iroquois, Ford and Livingston counties.

Guantanamo, Cuba—Plans for a sewerage system and sewerage disposal works will be made by Eduardo J. Chibas, M. Am. Soc. C. E. of Santiago de Cuba. He will also report on the improvement of the streets.

Batavia, N. Y.—The bd. of sewer comrs. has submitted a report with two plans for improving the sewerage system, one by means of sand filtration at an estimated cost of $39,000 and the other by means of contact beds at a cost of $41,000.

Youngstown, O.—The construction of a drainage canal about five miles long is contemplated by Columbiana and Mahoning counties; J. A. Brooks, East Liverpool, is a comr. for Columbiana county and J. W. Van Auken of Youngstown a comr. for Mahoning county.

Oneida, N. Y.—City Engineer Vedder was directed Sept. 23 to prepare plans and specifications for an 8-inch sewer in West-st., between Stone and Cherry, and also in the blocks between Lenox-ave. and Cherry-st.

Nashville, Tenn.—Bills passed second reading Sept. 23 appropriating $73,000 for extending the Edgefield branch sewer, $2,200 for extending the Wharf-ave. sewer, $3,500 for concrete floor to the outlet of Lick Branch sewer.

Marlboro, Mass.—The plans for the proposed surface water sewer system have been completed. They provide for the reconstruction and use of Hardiman brook as the main channel of the system. J. F. Bigelow, cy. engr.

Denver, Col.—The citizens of Globeville and Elyria have registered their protest against emptying this city's sewage into the Platte river, near their towns, and have asked that the main line of the sewer be extended beyond the Globeville limits.

Millburn, N. J.—The plans and specifications for the proposed lateral sewerage system have been accepted and an ordinance has passed second reading. The plans involve 59,055 ft. of 8, 10 and 12-inch pipe. The total estimated cost of the system is $47,000.

The construction of sewerage systems is contemplated at the following places: Hyde Park, O.; Savanna, Ill.; Black River, N. Y.; Rockaway Beach, N. Y.; Vailsburg, N. J.; Opelousas, La.; Wyoming, O.; Eaton, O.; Winnetka, Ill.; Venice, Ill.; Clay Center, Kas.; Honey Grove, Tex.; Hudson, Mass.; Baldwinsville, N. Y.; Cape Charles, Va.; Franklin, Ky.; Glace Bay, N. S.

Skaneateles, N. Y.—Prof. Olin H. Landreth, cons. engr. of the state department of health, has recommended that public sewers and sewage disposal works be provided for this village. He reports that the private sewers of this village drain into Skaneateles lake, from which Syracuse obtains its water supply, and that in time the waters of this lake will be materially polluted and made unfit for drinking purposes.

CONTRACTS TO BE LET.

Brazil, Ind.—Sealed bids are asked until Oct. 14 for building a sewerage system. F. K. De Armey.

Grand Rapids, Mich.—Sealed bids are asked until 2:30 p. m., Oct. 7, for a pub-

lic sewer along west side ditch involving 15,025 ft. of sewer ranging in diameter from 3.5 to 7.5 ft. L. W. Anderson, cy. engr.

Roanoke, Va.—Bids are asked until Oct. 3 for building sewers in Dist. 8. J. H. Wingate, cy. engr.

Grand Forks, N. D.—Bids are asked until 7 p. m., Oct. 6, for 1,254 ft. of pipe sewer. F. Brown, cy. audt.

Ironton, O.—Bids are asked until Oct. 2 for building several sewers in Dist. No. 4. George H. Davies, cy. clk.

Cincinnati, O.—Sealed bids are asked until Oct. 15 for a sewer in Linwood-ave. Robert Allison, prest. b. p. w.

Little Rock, Ark.—Bids are asked until Oct. 4 for 4 mis. of 6, 8 and 10 in. pipe sewer. James F. Keiser, cy. engr.

Toledo, O.—Sealed bids are asked until Oct. 6 for building brick and pipe sewers in certain streets. Charles H. Nauts, cy. clk.

Hartford City, Ind.—Sealed bids are asked until 7 p. m., Oct. 3, for a sewer in Franklin-st. R. L. Manor, cy. clk.

Glenville, O.—Sealed bids are asked until 12 m., Oct. 4, for a main storm sewer in Doan-st. B. T. Davies, jr., vil. clk.

Burlington, Ia.—Bids are asked until Oct. 6 for building sewers in Arch and N. Oak-sts. and Central-ave. Emmet Steece, cy. engr.

Alliance, O.—Bids are asked until Oct. 6 for building 730 ft. of 8 in. sewer, 2 manholes and one flush tank. Charles O. Silver, cy. clk.

Milwaukee, Wis.—Sealed bids are asked until 10:30 a. m., Oct. 2, for a sewer in Thirty-ninth and Galena-sts. Charles J. Poetsch, chmn. b. p. w.

Indianapolis, Ind.—Sealed bids are asked until Oct. 1 for a sewer in Alabama-st., from South to Louisiana-st. Harold C. Megrew, chmn. b. p. w.

Akron, O.—Sealed bids are asked until 12 m., Oct. 11, for a main trunk sewer in sewer districts Nos. 3 and 10. Charles H. Isbell, clk. bd. cy. comrs.

Waukegon, Ill.—Sealed bids are asked until 8 p. m., Oct. 10, for 6 mis. of vitrified pipe sewer, 168 manholes, 20 flush tanks and one bulkhead, with iron outlet into Lake Michigan. F. Finer, prest. bd. local impvts.

CONTRACTS AWARDED.

Brewer, Me.—A. D. Olmstead & Co. secured the contract for the S. Main-st. sewer.

Cobden, Ont.—The contract for a sewerage system was awarded to D. McNaughton for $3,500.

New Orleans, La.—The bids received Aug. 12 for building sewers were rejected Sept. 3.

Summit, N. J.—The contract for a sewer in Beekman road was awarded to Peter Kearns.

Stockton, Cal.—A. B. Munson has been awarded a contract for a sewer on the South Side for $6,431.

Billings, Mont.—The contract for building sewers was awarded Sept. 16 to Wesch & Cederhorn for $2,848.

Two Rivers, Wis.—The contract for a sewerage system was awarded Murphy & Grey of Manitowoc for $16,000.

Hamilton, Ont.—The contract for a sewer in Picton-st. was awarded to J. J. Armstrong at 31 cts. a ft.

Watervliet, N. Y.—The contract for a sewer on Broadway was awarded to Robert H. Stony for $1,209.

Jamesville, Wis.—John W. Peters was awarded the contract for a storm sewer in High-st. for $1,434.

St. Paul, Minn.—The contract for a sewer in Farrington-ave. has been awarded to Christ Johnson.

Peoria, Ill.—The Crescent Stone Company secured the contract for the Persimmon-st. sewer for $17,000.

Irvington, N. J.—Headley & Christie secured the contract Sept. 19 for building the sewerage system for $46,071.50.

Fond du Lac, Wis.—Sewer contracts were awarded Sept. 16 as follows: Forrest-ave., Chris Johnson; Butler-st., S. H. Cole.

Shenandoah, Ia.—The contract for a sewer for the school house has been awarded to J. J. Dunnegan for about $1,700.

Muscatine, Ia.—The contract for a sewer in Sixth-st., between Iowa-ave. and Cedar-st., was awarded Sept. 18 to Korneman & Kemper.

East Washington, Pa.—The contract for building sewers on several streets was awarded Sept. 16 to R. T. Hallam & Sons.

Perth Amboy, N. J.—The contract for building an 18-inch pipe sewer in Woodbridge road was awarded Sept. 16 to Martin Hansen.

Carthage, N. Y.—The contract for a sewerage system in West Carthage was awarded Sept. 18 to George S. Miller of Oneida for $19,338.

Athol, Mass.—The contract for building 5 mis. of sewer and connections was awarded to Lang, Little & Company of Boston, for $20,000.

Payne, O.—M. P. Jacobs of Antwerp, O., has been awarded a contract for the sewerage system in this place for $9,595.

Springfield, Ill.—John W. Ryan secured the contract for an 18-inch pipe sewer in Adams-st. between College and Pasfield-sts., at 76 cents a ft.

Mt. Kisco, N. Y.—Tony Richards of White Plains, N. Y., was awarded the contract for building the stone water drain emptying into Branch Brook.

Kansas City, Mo.—The contract for a sewer in dist. 198 was awarded Sept. 19 to Matt Knilen for $11,468.85; in dist. No. 162, R. W. Mullins, $7,341.61.

Port Huron, Mich.—Kaumeier Bros. submitted the lowest bid Sept. 11 for building a main sewer in the tunnel dist. at prices ranging from $7.83 to $1.50 a ft.

Washington, D. C.—The contract for building a portion of the B-st. and New Jersey-ave. trunk sewer was awarded to Bernard J. Sullivan, of Philadelphia.

Westfield, Mass.—The contract for the north section of the surface sewer system has been awarded to Seymour & Newell, of Springfield, Mass., for $34,765.

Buffalo, N. Y.—The Buffalo Contracting Company was awarded the contract Sept. 18 for building the sewers in Crowley-ave. from Fonda to Ontario-sts., for $2,210.

Monmouth, Ill.—The contract for a sew-

age disposal plant, including septic tank, was awarded Sept. 13 to Bartlett & Kling of Galesburg. The bids were opened Aug. 30.

Chicago, Ill.—John P. Agnew submitted the lowest bid, Sept. 24 for the foundation for the superstructure, pumps and intake for the Thirty-ninth-st. pumping station at $215,000.

Tampico, Mex.—The contract for building sewers and water works was awarded to the James P. McDonald Company, 35 Nassau-st. New York City, for about $1,000,000.

St. Louis, Mo.—Bids were submitted Sept. 16 for constructing joint district sewers in Rock Spring joint sewer district as follows: Hill-O'Meara Construction Company, $111,477; Herman Construction Company, $113,069.

Washington, D. C.—Sewer contracts were awarded Sept. 26 as follows: Coyle & Co., sewers A and E; M. F. Talty, sewers B and C; Warren F. Brenizer Company, sewers D, F and G. The bids were received Sept. 13.

Oneida, N. Y.—Contracts were awarded Sept. 11 to Fitch & Thompson for building lateral sewers in Lenox-ave. and Vanderbilt-ave., and Broad-st., for $1,112.80 for the first, and $1,518.85 for the last two named.

WATER-WORKS.

Jacksonville, Ill.—An ordinance was passed Sept. 17 to sell the water works to F. W. Mayhon and others of Chicago for a period of thirty years.

Houston, Tex.—The city filed suit Sept. 19 against the Houston Water Company for breach of contract and damages in the sum of $116,596 with interest, cost of suit, etc.

Kokomo, Ind.—(Special.)—The ordinance granting the Kokomo Water Works Company an extension of its franchise for twelve years, with a reduction of 30 per cent. from the old ordinance rates and 25 per cent. in instances where special rates exist, has been adopted.

CONTEMPLATED WORK.

Mishawaka, Ind.—A new water supply from wells is contemplated.

Waterloo, Ia.—The construction of municipal water works is urged.

Mt. Clemens, Mich.—The purchase of a new engine and pump has been recommended.

Eau Claire, Mich.—A new water works system has been proposed. Vil. coun.

Nampa, Idaho.—Plans and estimates are being made for a water works system.

Seneca Falls, N. Y.—Municipal ownership of the water works system is contemplated.

Centerville, O.—Plans for water works have been submitted. B. F. Vaughn, mayor.

Le Compte, La.—The contract for water works will probably be awarded about Dec. 1.

Steubenville, O.—The construction of a new basin is contemplated by the water trustees.

Walla Walla, Wash.—The development and extension of the water works system is contemplated.

Newport, N. Y.—This town has voted to issue $15,000 bonds for extending the water works system.

Springfield, S. D.—The council has decided to sink a new artesian well to increase the water supply.

Jackson, Miss.—A special committee has been appointed to secure a pure supply from artesian wells.

Sherman Heights, Tenn.—A company is being organized to build water works for this town and East Chattanooga.

Dickinson, N. D.—The city council has under consideration a proposition for the installation of a water works plant.

Atlanta, Ga.—Mayor Mims is urging the council to issue $400,000 bonds for perfecting the water works system.

Kiester, Minn.—Plans for a small water works system will be prepared by George P. Hawley of Fairmont, Minn.

Solvay, N. Y.—This village voted Aug. 15 to issue $6,400 bonds for repairs to the water works and electric light system.

Hamilton, O.—The special committee has recommended a new pumping station for the water works system at a cost of $83,600.

Minneapolis, Minn.—The water works committee has set aside $200,000 for the construction of two large distributing mains.

The question of issuing bonds for building water works will be voted on as follows: Webster Groves, Mo.; Prophetstown, Ill., Oct. 3.

Lancaster, Pa.—The question of issuing bonds for improving the water supply will be voted on Nov. 4. E. F. Trailey, supt. w. w.

Lima, O.—Bids will probably be asked in October for a new pump, 1 mi. of 24 in. c. i. pipe, etc. J. N. Hutchinson, secy.

Marine City, Mich.—The city clerk was directed, Sept. 18, to purchase 1,050 ft. of water pipe and necessary hydrants. Mayor Craig.

Brooklyn, O.—Resolutions were passed Sept. 10 for laying water mains in McArthur-ave. and Pearl and Bratten-sts. J. W. Rogers, mayor.

Youngstown, O.—Plans and specifications are being prepared for a filtration plant. W. A. Beecher, J. R. Wooley and W. P. Williamson, com.

Cincinnatus, N. Y.—The estimated cost of a water works system, not including reservoir site, cost of springs and right-of-way is $11,000.

Baltimore, Md.—The water committee reported favorably on the resolution to appoint a commission to consider the feasibility of a filtration plant.

The extension of water mains is proposed at the following places: Arcola, Ill.; Tacoma, Wash.; Lincoln, Neb.; Ballard, Wash.

Abingdon, Ill.—An ordinance has been passed for constructing water mains and hydrants in a large number of streets. Mayor Shipplett.

New York City.—The engineers of the Brooklyn water department are preparing plans for three new pumping stations.

which, when completed will increase the water supply from 10,000,000 to 12,000,000 gals. a day.

Springfield, Mass.—The water commissioners are considering propositions for installing a water filter plant at Ludlow. Mayor Ellis.

Vailsburg, N. J.—Eugene A. Murray, engr., was directed, Sept. 20, to prepare plans for lowering 2,700 ft. of water pipe in Sanford-st.

Norfolk, Va.—The construction of a 30-inch water main from the water works to this city, five miles, is contemplated. H. L. Smith, supt.

Sodus, N. Y.—This town contemplates letting a franchise for the construction of water works, according to press reports. Lewis H. Clark is interested.

Hartford, Conn.—Cy. Engr. Ford was authorized Sept. 17 to draw specifications and ask for bids for an auxiliary pumping outfit at the pumping station.

Rogers, Ark.—The water works commission rejected Sept. 17 the bids for building water works, and will employ a superintendent and build the plant.

Salem, Va.—Plans for improving the water supply and for building a park will be prepared by Prof. P. S. Nugart of the Syracuse university, Syracuse, N. Y.

Washington, D. C.—The engineer in charge of the district water works has decided to postpone the opening of bids for constructing the filtration apparatus.

Pittston, Pa.—An ordinance has been introduced providing for the lowering of the 24-in. water main under the Monongahela river at a cost of about $5,000.

Oneida, N. Y.—Wellington R. Vedder, cy. engr., has been directed to prepare plans and specifications for a new spillway at the storage reservoir of the water works system.

Bellaire, O.—The new plans and specifications for the proposed water works are about completed. The plans provide for a new engine house, boilers, pumping station and intake pipe.

Youngstown, O.—The bd. of w. w. trustees has purchased 8 acres of land for a site for a filtration plant. Plans and estimates for a plant to filter Mahoning river water will be made at once.

The construction of water works systems is contemplated at the following places: Alfred, N. Y.; Stoneboro, Pa.; Sodus, N. Y.; Gonzales, Tex.; Wilmot, S. D.; Roanoke, Ill.; Albia, Ia.; Minden, La.

The question of issuing water works bonds has been favorably voted on as follows: Gas, Kas.; Ardmore, I. T.; Platte, S. D.; Montrose, S. D.; Kiester, Minn.; Newport, N. Y.; Galton, O.

Middletown, Pa.—The plant of the Middletown & Swatara Water Company has been purchased by Millersburg parties, and the new water supply will be secured from Round top, about 3 mis. from this place.

Flora, Ill.—The city council has accepted the proposition of the Flora Ice and Cold Storage Company for building a water works system. The company agrees to merge the city light plant, the water works system and the ice plant.

Erie, Pa.—The water commissioners are making surveys for extending the present 5-ft. intake from the crib in Erie bay, through Presque isle and into Lake Erie, with the intake curb in the lake. Geo. H. Fenkell, engr. comrs.

Richmond, Va.—The city coun. has received a proposition to furnish this city with water. Mayor Taylor has approved a resolution instructing the committees on finance and water to report a scheme for raising $350,000 to be used in securing clear water.

St. Louis, Mo.—Ordinances have been introduced providing for the following: An appropriation of $100,000 for the establishment of sprinkling plugs for the use of sprinkling and washing the streets; appropriation of $15,000 to procure water meters for consumers.

Anderson, Ind.—(Special.)—J. J. Netterville is chairman of a committee appointed to investigate the matter of substituting this city's present water works supply with a pure water system, and desires to correspond with competent engineers regarding plans, estimates, etc.

Dallas, Tex.—The report of the water commissioners and council on public improvements recommending that Chester B. Davis of New York City be employed to make surveys, with plans and specifications of cost for a pipe line to Bachinem reservoir, has been adopted by the city council.

St. Louis, Mo.—This city is considering the question of a filtration plant. The New York Continental Jewell Filtration Company has submitted a proposition to build a filter plant upon the general lines laid down by Water Commissioner Flad. There is a disposition on the part of the city, however, to invite competition.

CONTRACTS TO BE LET.

Montreal, Quebec.—Bids are asked until Dec. 19 for an earthwork dam across the old aqueduct, Cy. clk.

North Milwaukee, Wis.—Sealed bids are asked until Oct. 6 for laying water mains. W. E. Chase, vil. clk.

Findlay, O.—Bids are asked until Oct. 7 for the construction of a pipe line from Limestone ridge to this city, 11-mis.

Paulsboro, N. J.—Bids are asked until Oct. 11 for building a waterworks system. Dr. George C. Laws, prest. Paulsboro Water Company.

Brockton, Mass.—Bids are asked until Nov. 8 for furnishing and erecting 6,000,000 gal. pumping engine. Charles R. Felton, cy. engr.

Weiser, Idaho.—Sealed bids are asked until m., Oct. 3 for building a water works system. Thomas E. Kelly, mayor; Stewart H. Trons, cy. clk.

El Paso, Tex.—Sealed bids are asked until 12 m., Oct. 2 for supplying this city with water for thirty-five years. E. F. Hammet, mayor; J. A. Escajeda, cy. clk.

Grand Forks, N. D.—Sealed bids are asked until 7 p. m., Oct. 6 for constructing a 6-in. water main in N. Fifth-st. between Ione and Lulu-aves. F. A. Brown, co. audt.

Centralia, Ill.—Sealed bids are asked until 7 a. m., Oct. 7 for laying a 6-in. water main and erecting two hydrants in E. Broadway. A. J. Sligar, chmn. water com.

Cleveland, O.—Sealed bids are asked until 12 m., Oct. 3 for the construction, delivery and erection of 6 water tube boilers at the Kirtland pumping station. Charles P. Salen, dir. pub. wks.

Webster Groves, Mo.—Sealed bids are asked until 8 p. m., Oct. 6 for furnishing cast iron pipe and specials, as follows: 105 tons 12-in., 75 tons 10-in., 150 tons 8-in., 260 tons 6-in., 350 tons 4-in., c. i. pipe; 12½ tons special castings. Cy. clk.

Chicago, Ill.—Sealed bids are asked until 12 m., Oct. 15 for constructing certain works for the conservation of the water power on the channel of the sanitary district of Chicago and the Desplaines river. Thomas A. Smyth, prest. bd. trustees sanitary dist.

Moline, Ill.—Bids are asked until Oct. 29 for constructing a filter plant as follows: A mechanical filter plant of 3,500,000 gals.; B—Mechanical filter plant, including building; C—low lift pumping plant to raise water to filter; D—clear water reservoir; E—high duty pumping engine. P. H. Wessel, mayor.

CONTRACTS AWARDED.

Albia, Ia.—A franchise for water works has been granted Geo. Smith.

Pocahontas, Ia.—The contract for a water works system was awarded to F. E. Bush.

Middleport, N. Y.—A water works franchise has been granted F. A. Dudley of Niagara Falls.

Zellonople, Pa.—The contract for a water works system has been awarded to J. P. Leaf of Rochester, Pa.

Wilmington, Del.—The contract for cement and sand for the new dam was awarded Sept. 18 to John M. Solomon.

Lonaconing, Md.—A franchise has been granted the Midland-Elk Lick Water Company for laying water mains.

New York City.—The contract for laying water mains in a number of streets was awarded Sept. 4 to Norton & Dalton for $93,243.

Farmington, Mo.—The contract for constructing the mains has been awarded to Daniel W. Jones and A. T. Spradling for $23,231.80.

Bennett, Ia.—The contract for building the new water works system has been awarded to G. H. Meredith of Cedar Rapids for $5,471.12.

Westerville, O.—The contract for laying mains, making connections, putting in machinery, etc., has been awarded to T. C. Brooks & Son of Jackson, Mich., for $20,-000.

Tampico, Mex.—The contract for constructing sewers, water works and paving has been awarded to the James P. McDonald Company, 35 Nassau-st., New York City for $1,500,000.

Little Falls, Minn.—The contract for laying the water mains in the new extension from the north end of Second-st. has been awarded to Harrison & Peterson.

Kansas City, Mo.—The contract for furnishing this city with a vertical, triple expansion pumping engine was awarded Sept. 16 to the Barr Pumping Engine Company of Philadelphia for $130,500.

Syracuse, N. Y.—The contract for 75,000 tons of stone work for the construction of the bulk-head basin at Stony Point shoals in Delaware bay has been awarded to Hughes Bros. & Bangs of this city for $106,050.

Biloxi, Miss.—The contract for improving and enlarging the water works system was awarded Sept. 17 as follows: Furnishing pipe, U. S. Cast Iron and Pipe Company; hydrants, R. D. Wood & Co., Philadelphia; service connections, Martin Mass, Biloxi; laying pipe, Wagner & Co.

Philadelphia, Pa.—The contract for laying a 20-in. main in Water-st. was awarded Sept. 18 to the Hoffman Engrg. Company for $35,000. The contract for building engine and boiler house No. 2 of the pumping station at Lardner's Point, near the Torresdale filtration plant, was awarded to Geo. C. Dietrich for $532,000.

LIGHT, HEAT AND POWER.

Winsboro, S. C.—Bids will be received about Oct. 15 for an electric plant.

Glencoe, Ill.—The citizens are discussing the question of a municipal gas plant.

Iowa City, Ia.—The Iowa City Gas Company is preparing to build a new plant.

Shelby, O.—The Logan Gas and Fuel Company has asked for a franchise in this city.

Ballard, Wash.—Plans for an electric plant have been approved. O. M. Rankin cy. engr.

Hanford, Cal.—Bids are asked until Oct. 23 for the purchase of a gas franchise.

Baton Rouge, La.—Bids will be asked soon for lighting this city with electricity for 10 years.

Cape May, N. J.—Plans for an electric plant are being prepared by the Cape May Electric Company.

Waukegan, Ill.—A contract for street lighting has been awarded to the Waukegan Electric Light Company.

South Norwalk, Conn.—The county commissioners has recommended the reconstruction of a municipal electric plant.

Solvay, N. Y.—This village voted Sept. 15 to issue bonds for repairs to the electric light system.

Fulton, N. Y.—The Fulton Fuel and Light Company has been incorporated to manufacture gas for light and fuel.

Macon, Ga.—Bids are asked until Nov. 1 for lighting this city for 5 years. R. L. Willis, chmn. com.

Narragansett, R. I.—The question of lighting the streets by electric lights is being discussed.

Rome, Ga.—Sealed bids are asked until March 1 for an electric light plant. J. D. Hanks, mayor.

Eddystone, Pa.—A contract for lighting the city with electricity has been awarded to the Beacon Light Company.

Thompsonville, Conn.—Plans for a 250 H. P. addition are being considered by the Enfield Light and Power Company.

Milwaukee, Wis.—The Milwaukee Electric Railway and Light Company will build a new power house at a cost of $100,000.

Deshler, O.—S. Coddingham has asked for a fifteen-year franchise for operating and maintaining an electric light plant.

Omaha, Neb.—Plans and specifications for an addition to the electric light plant have been approved and bids authorized.

Norfolk, Va.—Bids are asked until Nov. 19 for an electric plant for the People's Light and Power Company. J. G. Tilton, prest.

Denver, Col.—The Denver Highlands Electric Company has asked for a franchise to extend its business throughout the entire city.

Concord, N. H.—A committee is investigating the matter of awarding a new ten-year contract for street lighting. H. G. Sargent, mayor.

East Grand Rapids, Mich.—The village board granted a thirty-year franchise for lighting this city with gas to the Grand Rapids Gas Light Company.

Muncie, Ind.—The Wabash Oil and Gas Company has petitioned for a franchise to lay mains in the streets to supply the citizens with gas.

Mankato, Minn.—The committee on a new lighting plant reported Sept. 17 in favor of organizing a lighting company on the co-operative plan.

Duluth, Minn.—Allen McDonald, Whitney Wall and William Getty have been appointed a committee to investigate the street lighting question.

Laurium, Mich.—A franchise authorizing the installation of a general heating and lighting plant will probably be granted John Burder of Red Jacket.

Alexandria, Ind.—J. Thomas Roberts asked for a franchise Sept. 15 to operate a plant for electric lighting and heating, electric motive power, etc.

Baraboo, Wis.—The city council granted two lighting franchises Sept. 11, one to B. H. Strong for twenty-five years, and one to L. E. Hoyt for twenty years.

Weiser, Idaho—Sealed bids are asked until Oct 3 for constructing an electric light system. Thomas E. Kelley, mayor; Stewart H. Frank, cy. clk.

Fayetteville, N. C.—The contract for an electric light plant has been awarded to the Richmond Engineering Company of Richmond, Va., for $11,306.

Lansing, Mich.—The special committee and the lighting committee considered plans for a municipal lighting plant Sept. 19, but action was deferred.

Fayetteville, N. C.—The contract for an electric light plant has been awarded to the Richmond Engineering Company of Richmond, Va., for $11,306.

Fremont, Neb.—The contract for a new alternator at the electric light plant was awarded to the Electrical Company of Ft. Wayne, Ind., for $3,900.

The question of issuing bonds for electric light plants has been favorably voted on at the following places: Marcus, Ia., Blue Ridge, Ga.

San. Pedro, Cal.—Bids are asked until Oct. 14 for the purchase of a 50-yr. franchise for a gas plant. O. C. Abbott, cy. clk.; W. A. Foster, cy. engr.

The question of issuing bonds for electric light plants will be voted on as follows: De Smet, S. D., North Amherst, O., Oct. 6, Adrian, Mich.

Santa Barbara, Cal.—A franchise for an electric light plant system for the Santa Maria and Limpoe valleys has been granted to W. W. Barnes, J. T. Coffman and others.

Colorado Springs, Col.—The Colorado Springs Electric Company has been awarded a contract for heating the new court house and will probably receive the lighting contract.

Calumet, Mich.—The contract for the addition to the plant of the Peninsula Electric Light & Power Company has been awarded to Pendergast & Clarkson of Chicago for $100,000.

Trenton, Mich.—The village council has directed President Stokes to secure prices for a municipal electric light plant with a capacity of 60 street lights and 1,000 incandescent lights.

Goshen, Ind—The 50-yr. franchise has been vetoed and a 25-yr. franchise granted the Hawkes Electric Light Company with a reservation to purchase the plant at the end of 15 yrs.

Chattanooga, Tenn.—Bids will be received until 2:30 p. m., Oct. 7 for lighting with electric lamps the streets and public buildings. A. McMillen, clk. B. P. W.; J. C. Howell, chmn.

Montreal, Quebec.—The contract for supplying electric power for 5 years to run the new pump for the high level reservoir was awarded Sept. 22 to the Lachine Rapids Hydraulic Company for $40,000.

Havelock, Neb.—A gasoline street lighting company has offered to put in a sufficient number of posts and lamps for testing the different systems for 30 days' trial free of charge. Mayor Hinkle.

Evanston, Ill.—The Yaryan Company has acepted the franchise offered by the city council which is as follows: Heating 20 cts. a sq. ft. of radiation, with the increase limited to 50 per cent. over the former price.

The construction of electric light plants is contemplated at the following places: Ephrata, Pa., Sparta, Ga., Huntsville, Ala., Lake Linden, Mich., Effingham, Kas., Carrington, N. D., Manchester, O., Webster Grove, Mo.

New Orleans, La.—An application was filed in the supreme court Sept. 11 to compel Judge Fred D. King of the civil district court to issue an injunction to prevent the acceptance of the Bullard bid for erecting an electric light plant.

Vinton, Ia.—(Special.)—Bids are asked until Oct. 3 for a 60 K. W. 2-phase 1,100 volt cycle, direct connected alternating generator complete, and for an engine of 90 to 100 horse-power, with all fittings and appliances. E. L. Stickney, cy. clk.

Kansas City, Mo.—An ordinance was introduced in both houses of the council, Sept. 15, providing for the acceptance of the proposition of the Kansas City Electric Light Company, which agrees to light and maintain the arc lights of 2,000 candlepower at $65 a year for each light. The city is now paying $85 a year.

St. Paul, Minn.—A resolution was passed Sept. 18 directing the board of public works to prepare specifications for lighting the streets during 1903. The board is directed to furnish specifications providing

for the following: (1) Lighting that portion of the city now lighted by gasoline lamps with incandescent gasoline lamps for twelve months; (2) lighting that portion of the city now lighted by gas lamps with incandescent gasoline lamps for twelve months; (3) lighting that portion of the city now lighted by gas with gasoline incandescent lamps from May 1, 1903, to Jan. 1, 1904; (4) lighting that portion now lighted with gas with incandescent gas lamps from Jan. 1 to May 1, 1903; (5) lighting that portion of the city now lighted with gas with incandescent gas lamps for twelve months; (6) lighting that portion of the city now lighted with electric lights with arc lights for twelve months; (7) lighting that portion of the city now lighted with gas with incandescent gas lamps from Jan. 1, 1903, to June 1, 1903; (8) lighting that portion of the city now lighted with gas with incandescent gasoline lamps from June 1, 1903, to Jan. 1, 1904; (9) lighting that portion of the city now lighted with gas and gasoline lamps with incandescent gasoline lamps from May 1, 1903, to June 1, 1904; (10) lighting that portion of the city now lighted with gas and gasoline lamps with incandescent gasoline lamps from June 1, 1903, to Jan. 1, 1904.

Specifications will be prepared also for lighting the city with acetylene gas or any other illuminant.

BRIDGES.

Williamsport, Pa.—A new steel bridge is contemplated.

Lewistown, Pa.—A 600-ft. iron bridge at Granville is proposed.

Peoria, Ill.—The estimated cost of the proposed new wagon bridge is $15,000.

Gas City, Ind.—The construction of a bridge is urged by the press.

Mason City, Ia.—A stone bridge is proposed across Willow creek at State-st.

Tannery, Pa.—Plans are being prepared for a steel bridge over Lehigh river.

Tipton, Ind.—Bids are asked until Oct. 4 for a 25-ft. steel bridge. Co. audt.

Brandon, Miss.—Bids are asked until Oct. 6 for two bridges. G. W. White, clk.

Winlock, Wash.—Bids are asked until Oct. 7 for a wooden bridge across Olequa creek.

Benton Harbor, Mich.—The question of building a steel viaduct across Ox creek at High-st. is under consideration.

Lafayette, Ind.—Bids are asked until Oct. 11 for building a wagon bridge at Linden-ave. Co. com'rs.

Eureka, Cal.—Bids are asked until Oct. 13 for a bridge across Redmond creek at Oriek. Clk. bd. suprs.

Anderson, Ind.—A contract will be let river at Delaware-st.
this fall for a wagon bridge over White

Elkton, Md.—The citizens of North East have petitioned for a new iron bridge across North East creek.

Indianapolis, Ind.—Bids are asked until Oct. for a bridge over Eagle creek. Harry B. Smith, co. audt.

Baltimore, Md.—W. W. Crosby, road engr. has recommended the building of a steel bridge across George's run, on Beckleysville road, to replace the present wooden structure.

Jasper, Ind.—Bids are asked until 1 p. m., Oct. 4, for a steel bridge across Kane creek. Bd. co. com'rs.

Reading, Pa.—The viewers have recommended the erection of a steel bridge across the Schuylkill river.

West Scranton, Pa.—The council has appropriated $3,500 for a new bridge across Keyser creek on Luzerne-st.

Ellendale, N. D.—Bids are asked until Oct. 16 for a steel bridge across the James river. H. J. Oberman, co. audt.

Alexandria, La.—Bids are asked until Oct. 11 for a bridge at Hineston Crossing, in Calcasieu swamp. J. D. Monroe, comr.

Indianapolis, Ind.—Bids are asked until 10 a. m. Oct. 8 for building a bridge over Big Eagle creek. Bd. co. comrs.

Rock Point, Mo.—Sealed bids are asked until Oct. 7 for building and repairing bridges. J. W. Krusor, road and bridge comr.

Mt. Vernon, Ind.—Bids are asked until Oct. 7 for an arch culvert on Uniontown road and a wooden bridge over Big creek. Bd. co. comrs.

Shelbyville, Ind.—Bids are asked until Oct. 18 for an iron bridge, with stone abutments, over Dory Fork and Foreman's branch. Bd. co. comrs.

Berryville, Va.—The supervisors have been directed to prepare plans for bridges over Shenandoah river at Cartleman and Berry's ferries.

Pasadena, Cal.—The erection of a bridge across the Arroyo at the foot of Madeline drive to connect with the Los Angeles boulevard is contemplated.

Crawfordsville, Ind.—S. Simpson, cy. engr., favors the substitution of cement for iron or steel in the construction of the county bridges.

Pittston, Pa.—An ordinance has been introduced into the council authorizing the construction of a bridge on the line of Center-ave., Twentieth ward.

West Hartford, Conn.—This town voted Sept. 10 to build a bridge across Trout brook at Fern-st. at a cost of $4,000. Henry C. Whitman, town clerk.

Victoria, B. C.—Sealed bids are asked until 4 p. m. Oct. 13 for the steel superstruction of a bridge to Point Ellice. Wellington J. Dowler, C. M. C.

Grand Rapids, Mich.—Sealed bids are asked until 3 p. m. Oct. 22 for pier extension and repair of piers and revetment at Ludington. Chas. Keller, capt. engrs.

Thomaston, Ga.—Bids are asked until Oct. 13 for building a lattice bridge across Flint river between Upson and Talbot counties. W. B. Adams, Upson co. comr.

Marion, Kas.—Bids are asked until 1 p. m. Oct. 9 for an iron bridge with stone abutments across the Cottonwood river east of the Florence. Ira S. Sterling, co. clk.

Alexandria, Va.—The substitution of an iron bridge for the wooden structure at the transfer stop of the B. & O. and the Southern railway stop at the foot of Wilkes-st. is contemplated.

Grenada, Miss.—Bids are asked until 10 a. m. Oct. 6 for moving an iron bridge

now over Iron Slough to McSwine creek in Dist. 4. Also for building a bridge over Beaver Dam creek. J. S. King, clk.

Terre Haute, Ind.—Sealed bids are asked until 1 p. m. Oct 24 for building the Allen and Dwyer bridges, between Vigo and Sullivan counties. J. M. Lang, audt. Sullivan Co.; James Soules, audt. Vigo Co.

Frankfort, Ind.—Sealed bids are asked until 2 p. m. Oct. 6 for a steel truss bridge on stone sub-structure or a stone bridge; a stone or brick arch; a bedstead truss with stone backing; a steel leg bridge with stone backing or a stone arch, and for two brick culverts. W. H. Armentrout, chmn. comrs.

GARBAGE DISPOSAL, STREET CLEANING AND SPRINKLING.

Champaign, Ill.—A garbage disposal plant is proposed.

Spokane, Wash.—The estimated cost of a crematory, exclusive of site, is $18,000.

Montreal, Que.—Bids will probably be asked soon for the removal of snow from the streets.

Chicago, Ill.—An additional appropriation of $50,000 for street cleaning purposes has been secured.

Elkhart, Ind.—The street com. has been authorized to make a contract for the removal of garbage from the streets and alleys.

Kokomo, Ind.—(Special.)—The street sweeper purchased recently from the Austin & Western Company of Chicago has been satisfactorily tested.

Clinton, Mass.—A plan for dividing this town into districts and assigning a collector to each district is being considered by the health board.

New York City—The contract for the final disposition of garbage in the Boro of Bronx has been awarded to the Decarie Mfg. Company of Minneapolis at $16,000 a year.

Jersey City, N. J.—The Newark Sanitary Reduction Company has been incorporated by H. O. Coughlan, A. D. Meekins and Paul Tisson, to dispose of garbage and house refuse.

Atlanta, Ga.—Bids are asked until Oct. 10 for collecting garbage and night soil for a term of 5 years; also for cremation of same for five years. Dr. E. H. Richardson, secy. health board.

Racine, Wis.—The bids for a garbage crematory were rejected Sept. 15 and City Engineer Connolly will visit certain cities and inspect crematory buildings and report to the council. Michael Higgins, jr., mayor.

Houston, Tex.—The proposition of Haralson & Co. to do the street sweeping for 5 years for $27,000 per annum, which, with garbage collection extra made a total of about $40,000, has been rejected. A resolution is being considered providing for bids for the repair and operation of the crematory.

Brooklyn, N. Y.—Street Cleaning Comr. Woodbury decided Sept. 19 to terminate the contract awarded Jas. Mundy recently for the collection of garbage in this boro. Mr. Mundy has not the equipment for doing the work properly, but he will continue until the contract is readvertised and awarded.

PARKS.

Troy, O.—This town has voted to establish a public park.

Howell, Mich.—The question of a public park is being considered.

Rochester, Minn.—The establishment of an island park is proposed.

Urbana, Ill.—The location of another park in the vicinity of Crystal Lake is proposed.

Sioux Falls, S. D.—The mayor has been appointed a committee to devise plans for establishing a system of parks.

Boise, Idaho.—A resolution has been passed recommending the purchase of ground to be converted into a city park.

Rock Island, Ill.—The plans of O. C. Simonds, landscape gardener, for improving Longview park at a cost of $4,200 have been adopted.

Milwaukee, Wis.—The committee on parks has recommended the purchase of the Helberg tract of 24 1-7 acres for an addition to Washington park.

Racine, Wis.—The purchase of property, known as the island, and also a part of the Erskine property, for the location of public parks, is contemplated.

Delphi, Ind.—Messrs. Blythe, Ruffing and Strayer have been appointed a committee to confer with the Commercial club regarding the purchase of certain lots for park purposes.

Grand Rapids, Mich.—The committee on ways and means and the committee on parks are considering a proposition, which if successful, will give the city one of the finest parks in the country.

FIRE APPARATUS.

Nashville, Tenn.—Bills were passed Sept. 25 appropriating $1,200 for purchase of new fire alarm boxes.

Delphi, Ind.—The chief of the fire department has asked for the purchase of 500 ft. additional hose and other articles. Mayor Robinson.

Newark, O.—Sealed bids are asked until Oct. 15 for the construction of the proposed building for the fire department, corner N. Fourth and Ark-sts. F. T. Maurath, cy. clk.

St. Louis, Mo.—A contract for three steam fire engines has been awarded to the W. S. Nott Company of Milwaukee; four combination chemical engines, P. J. Cooney Manufacturing Company of St. Louis.

Kansas City, Mo.—Sealed bids are asked until 2 p. m., Oct. 2, for 10,000 ft. of 2½-in. cotton, double jacket rubber lined fire hose. William Weston, purchasing agt.

TOO LATE FOR CLASSIFICATION

Albert Lea, Minn.—A sewerage system is proposed.

Cedar City, Utah—A water works system is proposed.

Toledo, O.—The contract for extending the Jefferson-st. sewer has been awarded to J. H. Horan.

Tuscaloosa, Ala.—The extension of the water works system to Newtown has been authorized.

Cass Lake, Minn.—Bids are asked until Oct. 15 for a sewerage system. W. S. Codd, village recorder.

Des Moines, Ia.—Sealed bids are asked until Oct. 10 for a sewer in Cottage-st. J. E. Stout, chmn. B. P. W.

Madison, Mo.—A committee has been appointed to consider the question of lighting the streets with electricity.

McKeesport, Pa.—Bids are asked until Oct. 7 for paving Strawberry alley with brick. A. R. Hitchens, compt.

Manchester, O.—Bids are asked until Oct. 8 for constructing an electric light plant. S. S. Alexander, secy.

Mexico, Mo.—R. S. McKinney, cy. engr., estimates the cost of grading six blocks of business streets at $13,470.30.

Boston, Mass.—Bids are asked until Oct. 8 for steel superstructure of sections A and B, Broadway bridge. Cy. engr.

Tonawanda, N. Y.—Sealed bids are asked until Oct. 14 for a pumping engine. William Hardeben, chm. municipal board.

Dexter, Mich.—The contract for an electric light plant was awarded to Thomas Muirs & Son of Detroit for $8,100.

Hartford, Conn.—A resolution was passed Sept. 22 directing the street board to pave Pearl-st. with asphalt during 1903.

Lincoln, Neb.—The contract for paving C-st., from Eleventh to Seventeenth, was awarded Sept. 22 to the Green River Rock Asphalt Company.

Toronto, Ont.—The board of control has been directed to secure tenders on a municipal asphalt plant, cy. engr. Rust.

Little Rock, Ark.—Bids are asked until Oct. 4 for 4 mis. of 6, 8 and 10-in. pipe sewers. James F. Kieser, engr. in charge.

Green Bay, Wis.—Sealed bids are asked until 12 m. Oct. 9 for a 20-inch steel pipe sewer. Leonard Findersein, chmn. com. on sewers.

Evansville, Ind.—Bids are asked until Oct. 4 for sweeping and cleaning certain streets for one year. W. Edward Clarke, clk. B. P. W.

Carthage, O.—Sealed bids are asked until 12 m. Oct. 20 for improving Boake alley from Second to Wall-sts. L. Hall, village clerk.

St. Joseph, Mo.—The contract for paving Thirteenth-st., from Messina to Olive-st., was awarded Sept. 24 to the Phoenix Brick and Construction Company.

Berlin, Wis.—The committee on sidewalks was directed Sept. 17 to rebuild all limestone walks with plant or cement. Mayor Truesdell.

Michigan City, Ind.—Sealed bids are asked until Oct. 20 for lighting this city with electric arc lamps of 1,000 c. p. Edward J. Heise, cy. clerk.

Troy, N. Y.—Bids are asked until Oct. 3 for paving Pawling-ave. and Front-st. with brick or concrete. James M. Riley, clk. bd. Const. and Supply.

Lexington, Mo.—Sealed bids are asked until Oct. 6 for paving Main-st. from Broadway to Thirteenth with vitrified brick. W. C. Duncan, cy. engr.

Milwaukee, Wis.—Sealed bids are asked until 10:30 a. m. Oct. 2 for building a sewer in Thirty-ninth and Galena-sts. Charles J. Poetsch, chmn. B. P. W.

Crookston, Minn.—The contract for paving Main, Broadway, Robert and Second-sts. was awarded Sept. 17 to the Barber Asphalt Paving Company for $60,000.

Brooklyn, N. Y.—Bids are asked until Oct. 9 for a new boiler at the Mt. Prospect pumping station. Robert Greer Monroe, comr. gas supply, water and electricity.

Bucyrus, O.—Immediate action will be taken by the city council on the question of building a sewerage system. Mayor Valentine, W. B. Forrest and August Brommel, com.

Minneapolis, Minn.—The city engineer will probably visit Indianapolis and Terre Haute, Ind., to investigate the advisability of establishing a creosoted paving block plant.

Akron, O.—Bids are asked until Oct. 4 for furnishing material and building sidewalks and crossings, for the year beginning Oct. 1, 1902. Charles S. Isbell, clk. Bd. Co. Comrs.

Burlington, Ia.—Sealed bids are asked until 4 p. m. Oct. 6 for paving Valley-st. with brick and for building a sewer in N. Oak-st. with laterals. Emmet Steece, city engr.

New York City—Sealed bids are asked until Oct. 2 for paving the walks of the "Ramble," Central park, with rock asphalt mastic on concrete base. William R. Wilcox, com. of parks.

Springfield, Ill.—An ordinance was passed Sept. 22, providing for water meters on all service pipes in this city. An ordinance was passed for an 18-inch pipe sewer in Porterfield-st.

Marysville, Mo.—A contract for 10,649 sq. yds. of brick paving on concrete was awarded Sept. 20 to J. E. Lynch of Moberly, Mo., at $1.24 a sq. yd.; sand-stone curbing, 50 cents a lin. ft.; vit. curbing, 13 cents.

Nashville, Tenn.—Bills passed final reading Sept. 25, providing appropriations of $116,800 for street improvements and sewer extensions. Bills were introduced, appropriating $10,000 for paving Mart-st. with granite and $16,500 for paving Cherry-st. with granite.

Indianapois, Ind.—Sealed bids are asked until Oct. 15 for building a main sewer in Roosevelt, Valley and Brookside-aves. and Rural, Urbana and Nineteenth-sts. cement walks in St. Peter, Wilson and North-sts. Harold C. Megrew, chmn. B. Also for graveling roadways and building P. W.

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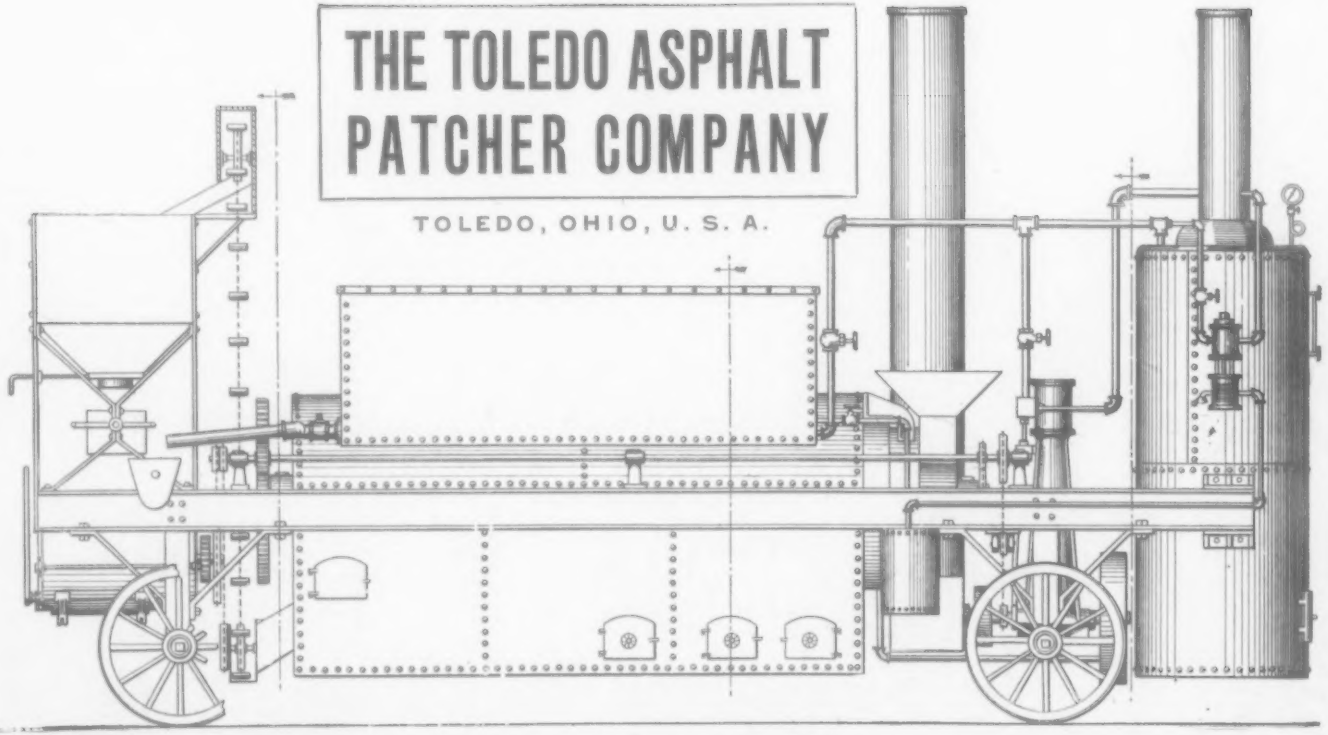

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